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PROCEEDINGS

OF THE

SCIENTIFIC MEETINGS

OF THE

ZOOLOGICAL SOCIETY

OF LONDON

FOR THE YEAR

1876.

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PROCEEDINGS

OF THE

SCIENTIFIC MEETINGS

OF THE

ZOOLOGICAL SOCIETY OF LONDON.

◆

January 4, 1876.

Prof. Newton, F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of December 1875:—

The registered additions to the Society's Menagerie during the month of December were 86 in number. Of these, 17 were acquired by presentation, 54 by purchase, 1 by exchange, 1 by birth, and 13 were received on deposit. The total number of departures during the same period, by death and removals, was 113.

The most noticeable additions during the month of December were as follows:—

A Haast's Apteryx (*Apteryx haasti*) from New Zealand, presented by Baron F. von Mueller, C.M.Z.S., 18th December, 1875. Two examples of this Apteryx were despatched by our esteemed correspondent from Melbourne; but only one reached us alive—the first living individual of this recently determined species (assuming that its distinctness from *A. oweni* is fairly established) that has arrived in this country.

A Night-Parrot (*Stringops habroptilus*) from New Zealand, presented by Mr. T. E. Featherston, 23rd December, 1875.

Three male Moose (*Alces machlis*) from North America, deposited 28th December, 1875.

A letter was read, addressed to the Secretary by Mr. George Brown, Corresponding Member, dated Port Hunter, Duke-of-York Island (lat. 4° 7′ S., long. 152° 22′ E.), Sept. 5, 1875, stating that he had shipped by the 'John Wesley,' for the Society, to the care of Dr. George Bennett at Sydney two Cassowaries, and a Cockatoo from the adjoining island of New Britain, and two Pigeons and two Parrots from Duke-of-York Island, and some other birds, which he trusted would arrive safely. Mr. Brown stated that he had a collector at work along with him, and hoped shortly to have made a good series of specimens of the hitherto almost unknown fauna of this and the neighbouring islands.

The Secretary had received intelligence from Dr. Bennett of the safe arrival of the two Cassowaries (*Casuarius bennetti*) and of four of the other birds at Sydney, and that they would be forwarded to the Society by the 'Paramatta' on her next return voyage.

The following extract was read from a letter addressed to the Secretary by Mr. R. Trimen, Curator of the South-African Museum, Cape-town, dated 24th Nov. 1875.

"Your note (P. Z. S. 1875, pp. 81, 82) on *Canis chama*, Smith, leads me to think that you may be interested in hearing that there are two specimens of that species in this Museum.

"They have hitherto been labelled *C. variegatoides*, Smith (South Afr. Qu. Journ. ii. p. 87), the example first received having been so determined by the late Curator; but on comparison of them with the characteristic plate (xviii.) in the 'Proceedings,' and with Dr. Smith's descriptions of the two species, it is clear that they are *C. chama* and not *C. variegatoides*.

"I should be glad to hear if you know any thing about the latter species.

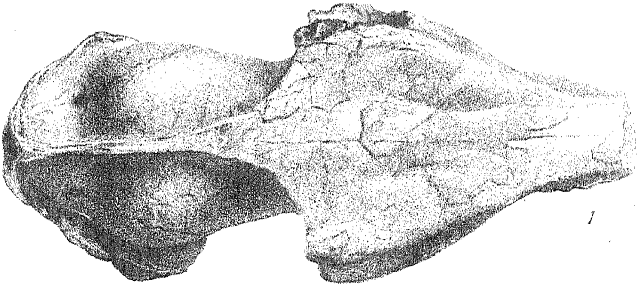
"The late Dr. J. E. Gray referred it (List Mamm. Brit. Mus. 1843, p. 58) to *C. mesomelas*, Schreb.; but as Dr. Smith was well acquainted with *C. mesomelas*, it seems improbable that he would have founded a new species on any thing less than a well-marked variety.

"*C. chama* is more widely spread than Dr. Smith's account would lead one to suppose, one of our two examples being from the neighbourhood of Beaufort (about the centre of this colony) and the other from near Caledon, a town about 70 miles east (and a little to the south) of Cape-town."

Dr. Hector, F.R.S., sent for exhibition three feather mats, made by the Maoris of New Zealand:—

No. 1. An ancient mat, obtained by Dr. Buller from a chief belonging to the Upper Wanganui river. Centre of pigeon's feathers (*Carpophaga novæ-zealandiæ*) trimmed with feathers from the Kaka (*Nestor meridionalis*) and North-Island Kiwi (*Apteryx mantelli*), and also tufts of hair of the ancient Maori dog, now extinct.

No. 2. A mat of Kiwi feathers (*Apteryx mantelli*) from Tampo Lake, North Island. The harsh feel, from the prolonged shafts



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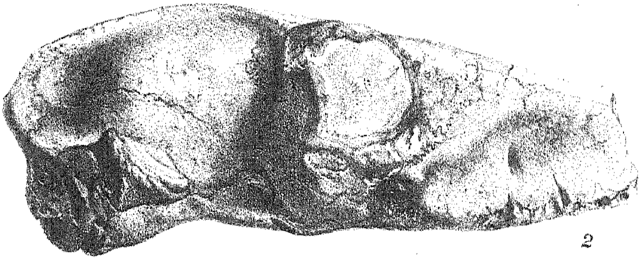

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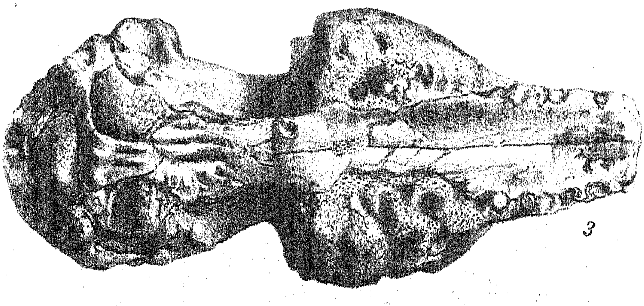

3

J. Smit, lith.
Hanhart imp.

XIPHODON PLATYCEPS, ½.

characteristic of this species, is obvious. Each feather is worked into the flax of the mat.

No. 3. A mat of wing-feathers of the Kaka (*Nestor meridionalis*), made by the natives near Wellington.

The following papers were read:—

1. Description of the Skull of a Species of *Xiphodon*, Cuvier. By William Henry Flower, F.R.S., F.Z.S., F.G.S., &c.

[Received November 16, 1875.]

(Plate I.)

The Hon. Auberon Herbert has lately presented to the Museum of the Royal College of Surgeons a fossil cranium which merits description, as in some measure assisting to fill up one of the still innumerable vacant spaces in the vast and complex history of living beings, a history gradually, slowly, but no less surely, being reconstructed by the united labours of explorers and palæontographers in all parts of the world.

In some respects, the specimen is provokingly unsatisfactory for the purpose, partly from its own incompleteness, but especially in the absence of certain knowledge as to its locality and geological antiquity. As it had passed through several hands before it came into Mr. Herbert's possession, there is no external history belonging to it, except a traditional statement that it was found in the neighbourhood of Woodbridge, in Suffolk.

At first little more was to be seen in it than an ovoid mass, nearly nine inches long, of dark grey, very compact, micaceous sandstone, with the surface smoothly rounded, and almost polished, evidently by the action of water. To a superficial observer it might have passed for a large rolled pebble; but closer examination showed that, besides having the general form of the head of an animal, the surface here and there presented darker patches, having a distinctly bony structure, which, from their situation and form, plainly revealed the general outline of the cranium within.

After a considerable amount of trouble, the closely adhering enveloping matrix was completely cleared away. The specimen was then shown to consist of the almost entire cranium (skull without lower jaw) of an animal of the size of a small sheep, with all its cavities and external depressions filled up with a matrix of the above-described sandstone, and then so rolled as to wear down some of the most prominent parts, as the zygomatic arch and, unfortunately the whole of the crowns of the teeth; for the palatal surface was exposed, smooth and polished, and the dental characters are only indicated by the alveoli or by roots worn down to the level of the surrounding bone. This is a very great loss, more especially as it is mainly by the form of the enamelled crowns of the teeth, generally better preserved than any other part of the body, that extinct forms of the group to which this one is allied have been characterized. The anterior portion of the skull has also been broken off close to the premaxillary suture, and consequently is wanting in the specimen.

Before proceeding to the description of the skull, the question naturally arises—What inference can be drawn from the condition of the fossil and its matrix as to its probable origin? Several experienced palæontologists to whom it was shown while still partially imbedded, declared that they knew of no fossil remains in a corresponding condition; and on comparing it with all the Mammalian specimens from every part of the world, contained in the British Museum, not one was found agreeing with it.

It certainly approximates very nearly in most of its characters to the curious "box stones" of the Suffolk Crag, to which Mr. Ray Lankester directed attention in the 'Quarterly Journal of the Geological Society' for 1870 (p. 499), though less ferruginous in colour than they generally are. If this suggestion should prove to be correct, it will confirm the indication as to locality mentioned above. The "box stones" are evidently waterworn aggregations of sandstone, generally, though by no means invariably, surrounding some organic body, and are remnants of a broken-up formation of an earlier age than the Red Crag in which they are now found. They are considered by Mr. Lankester, from a comparison of the molluscous fossils found in them, to be of "Diestien" age, or approximately equivalent to the so-called "Black Crag" of Antwerp; but, as will be mentioned hereafter, the zoological characters of the present specimen indicate a much greater geological antiquity.

The skull is that of a rather young animal, as shown by the still open suture between the basioccipital and the basisphenoid bones; but (at least in the case of existing Ruminants) this sign of immaturity remains some time after all the permanent teeth are in place, as appears to have been the case in the present specimen.

The cranium differs most notably from that of all existing species of Ruminants in the breadth and flatness of the frontal region between the orbits, the sudden contraction behind the orbits, and the large extent of the temporal fossæ, which is increased by well-marked sagittal and occipital crests. *Hyomoschus* is that to which it comes nearest; indeed, if we could imagine a larger animal of the Traguline type (*i. e.* an animal with a more lengthened head, and greater surface for the implantation of teeth and for the attachment of muscles, without corresponding increase of size of the brain-cavity and orbits—the modifications, in fact, which always occur in larger, as compared with smaller, members of a natural group), we should obtain a form closely resembling the present skull. Its special peculiarity would still be the flatness and width of the interorbital region above, in consequence of which the cavities of the orbits look directly outwards, instead of upwards and outwards as in *Hyomoschus*.

The sides of the face in front of the orbits are flat, as in the Tragulidæ and in many true Ruminants, without any sign of depression for a suborbital gland; but further forward, commencing just behind the large infraorbital foramen, is a wide and deep oval depression, extending over the whole of the region above the premolar teeth. Indications only of such a depression are seen in the Tragulidæ. There is no vacuity at the point of junction between the nasals, maxillæ, lachrymals and frontals, as in so many Cervidæ and Antelopes, and as is slightly indicated in *Hyomoschus*, though not in *Tragulus*. The sutures bounding the lachrymal bone, and between the maxilla and malar, are beautifully marked by deeply indented and wavy lines; but the premaxillary suture cannot be distinguished, being probably situated anteriorly to the point of fracture of the skull. The supraorbital foramina are not very large, and are placed in depressions rather nearer the middle line than the margin of the orbit, on a level with the anterior angle of that cavity; and, as in many existing Artiodactyles, a groove is continued forwards from them.

The posterior margin of the orbits, if, as is probable, they were originally complete, have been broken away, as has the entire zygomatic arch.

Turning to the base of the skull, the occipital condyles are lost; but the greater part of the basioccipital, with its pair of pr minent tubercles, remains. On each side of this the oval form of the bases of the large auditory bullæ can be distinctly made out, though they have been worn level to the rest of the surface of the skull. Their interior, however, can be seen to be filled with a fine network of cancellar tissue—a character common to the Suidæ, Tragulidæ, and Camelidæ, and absent in nearly all the true Ruminants. On the lower surface of the skull, as well as above, the elongation of the middle region is a conspicuous feature.

The hinder margin of the palate is produced backwards to the extent of fully three quarters of an inch beyond the notches on each side; but as its edge has been broken off, it is impossibie to describe its true form.

Between the teeth the surface is long, narrow, and depressed along the middle line. There is no sign, even at the anterior fractured edge, of the incisive foramina, which must consequently have been small; but there is a conspicuous foramen opening forwards near the outer edge of the palate opposite the second premolar tooth, and placed rather more posteriorly on the left than on the right side.

The alveoli, in most of which broken roots of teeth remain, form a continuous series along each side of the palate, as far forward as the line of fracture. Posteriorly they have been so much injured that their form and number cannot be made out with perfect certainty; but they appear to indicate teeth of the following character.

Beginning at the hinder end of the series, there are three molars, with four roots, wider transversely than from before backwards. The most anterior of the three must have been considerably smaller than the other two, which appear to have been nearly equal in size. In front of the molars there are seven roots, rounded or transversely elongated, placed in a single line, and nearly equidistant, indicating a series of compressed teeth, each with an anterior and a posterior root. Unfortunately the region in which the posterior of these teeth is situated is most damaged, and its form cannot be clearly made out; but, judging from the analogy of *Cænotherium*, *Xiphodon*, and allied forms, we have here the whole premolar series, the last having two external, and one internal root, obliterated in the specimen, and each of the others two roots only. The canines would thus be the teeth next beyond the line of fracture; but they evidently could not have been large, or deeply implanted, as in Tragulidæ. Of the incisors, nothing can be said from actual knowledge; but all analogies of allied forms lead to the supposition that the complete number (three on each side) were present.

It is evident that the animal to which this cranium belonged was a member of that group of Artiodactyles in which the general form of the modern Ruminants was shadowed out, but in which the typical number of teeth (eleven on each side, above and below, in continuous series) was still maintained, a group largely represented in the North-American Miocene strata by *Oreodon* and its allies, and of which the elegant little *Cænotherium* is one of the best-known European forms.

It differs, however, considerably in general form and proportions from any of the former as figured by Leidy, especially in the absence of a suborbital fossa, and is readily distinguished from the latter by the want of the deep median notch in the hinder edge of the palate, and by the more compressed form of the premolars, as estimated by the size of the roots. I am unable, however, to point out any character by which to separate it from Cuvier's *Xiphodon*, constituted in the 'Ossemens fossiles' as a subgenus of *Anoplotherium*. From the type of that form, *X. gracilis* of the Paris Upper Eocene, it differs, as far as can be inferred from descriptions and figures, chiefly in superior size, being about one third larger.

Another form to which it is closely allied is known as a British fossil from the Upper Eocene of Hordwell Cliff, having been described by Professor Owen under the name of *Dichodon cuspidatus*[*].

This animal is known by the teeth alone; and it is singular that, as far as the comparison of the size and shape of the roots or alveolar walls will allow, there is no reason why the teeth of *Dichodon cuspidatus* should not have belonged to our present specimen. Although there is not yet evidence enough to be assured of their identity, and more perfect specimens of either may show that the idea is fallacious, I yet think it necessary to point out the possibility. But then there are grave doubts, as already expressed by Gervais[†], whether *Dichodon* is really separable generically from *Xiphodon*. The main character on which the genus was founded, the peculiarity of the last lower premolar tooth, was, as the original describer himself subsequently pointed out, simply the result of a milk-tooth having been mistaken for a permanent one[‡]. The British species attributed to the genus *Dichobune* are also considered by Gervais to be more properly Xiphodons; so it is perfectly clear that a more careful comparison than has yet been made will be necessary to determine the claims of either to generic distinction.

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[*] Quarterly Journal of the Geological Society, vol. iv. 1848, p. 36.

[†] Zoologie et Paléontologie Française, 2^{me} edit. (1859), p. 159.

[‡] Quarterly Journ. Geol. Soc. vol. xiii. (1857), p. 190.

Being always strongly opposed to the multiplication of generic designations without very adequate grounds, I shall be content in the present instance, to retain the Cuvierian name *Xiphodon*[*], and, in the absence of any certain evidence that it belongs to any of the previously described species, to distinguish it as *X. platyceps*.

It may be added that all the species with which it is most nearly related, found both in England and France, belong to the Upper Eocene epoch, or "proïcene" of Gervais.

The principal dimensions of the cranium are as follows:—

	inches.	centim.
Length, in its mutilated state .... (About 9 inches if perfect.)	8·2	20·8
From anterior margin of orbit to occipital crest	5·3	13·5
From anterior margin of orbit to infraorbital foramen	1·5	3·8
Breadth of upper surface of skull between orbits..........................	2·8	7·2
Greatest parietal breadth	2·4	6·1
Breadth at anterior part of temporal fossa .	1·8	4.6
Height of skull (between frontal region and hinder part of palate)	2·6	6·6
Height of orbit......................	1·3	3·3
Length of molar and premolar series	3·7	9·5
Breadth of palate between posterior molars	9	2·3
„ „ between middle premolars	1·1	2·8

2. On a New Ziphioid Whale. By Julius von Haast, Ph.D., F.R.S., Director of the Canterbury Museum, Christchurch, New Zealand. Communicated by Prof. W. H. Flower, F.R.S.

[Received November 16, 1875.]

In the month of May of this year the Canterbury Museum received from W. Hood, Esq., of the Chatham Islands, three skulls of Ziphioid Whales taken from specimens stranded with about 25 others during the summer of last year on the Waitangi beach of the main island of that group.

They were described as "blackfish," all belonging to the same school, by my informant, who moreover believes that the whole series belonged to the same species.

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[*] Not, however, as a subgenus of *Anoplotherium*, from which it is perfectly distinct.

Unfortunately the skulls were so badly separated from the body that the occipital portion has been cut off, so as to lay the brain-cavity open; but as they were brought over with the greater portion of the skin still attached, some hitherto unknown and, as I think, peculiar characteristic features in the dentition of a Ziphioid genus have fortunately been preserved.

These three skulls accord in many respects with the genus *Mesoplodon* of Gervais, of which I will point out only one, viz. that they possess one tooth in each ramus of the lower jaw opposite the posterior edge of the symphysis, and of varying size and shape, either hidden below the gum or rising conspicuously above, according to age and sex. They differ, however, from all known species of the genus by possessing in the upper jaw, starting in a vertical line above the posterior border of the mandibular tooth, a series of small conical teeth slightly incurved, which extends to near the gape of the mouth.

I may here at once observe that these teeth are neither rudimentary nor are they confined to young animals, because, as I shall show in the sequel, these three skulls are derived from individuals of different ages, of which one is an aged (male?) animal, in which the row of teeth is best developed. It is thus evident that this series of teeth is a functional portion of the animal, and is constant and necessary for its proper nourishment, some of them being broken off, others evidently worn down from use. That these small teeth, of which the largest stands scarcely half an inch above the gums, are only rooted in the gums, does not lessen their value as a specific character of some importance.

Of the species of Ziphioid Whales inhabiting the New-Zealand seas I have obtained three, namely *Berardius arnouxii* (3 specimens), *Ziphius novæ zealandiæ*, and *Mesoplodon floweri* (Haast, MS.), none of which shows the least sign or rudiments of teeth in the upper jaw. Moreover several others have been secured in New Zealand and Australia; but nowhere can I find that, except the teeth in the lower jaw, they possessed any; and I have looked carefully over all the different papers on the Ziphioid Whales of the northern hemisphere to which I had access, without finding the slightest mention made of the occurrence of such a peculiar feature in their dentition.

On the contrary, Professor Flower in his excellent paper on the recent Ziphioid Whales (Trans. Zool. Soc. vol. viii. part 3), when enumerating their principal structural characters, begins by stating that they have "no functional teeth in the upper jaw." I believe that this term functional is rather ambiguous and can scarcely be applied to the genus under consideration, as we are totally unacquainted with the food on which it subsists, or the manner in which the same is obtained.

It is true, these teeth do not grow from alveolar grooves in the maxillaries, but only from a groove in the gums, and have their roots implanted therein; nevertheless I have no doubt that they are always present and do perform as distinct and important functions as those of *Kogia* or any of the Dolphins which possess teeth of similar form.

The first of the accompanying photographs shows the three skulls in comparison with each other; the second the middle portion of the second skull, belonging to an aged (male?) individual; whilst the following list gives the principal dimensions of these three skulls with the soft parts attached, as far as they could be ascertained; but as soon as they are macerated I shall offer some further observations on their anatomical structure.

Table of Measurements of three Skulls of Mesoplodon Grayi, *with the greater portion of soft parts adhering.*

	Skull I., probably female (full-grown).		Skull II., probably male (aged).		Skull III., probably male (young).	
	ft.	in.	ft.	in.	ft.	in.
Height of Skull from top of nasals (skin preserved) to lower border of pterygoids, the latter lying exposed...	0	11·13	0	11·38	0	9·12
Greatest breadth of skull across post-orbital processes of frontals............	1	0·48	1	0·88		9·51
Length of skull from crest of nasal bones to anterior border of rostrum, in a straight line	2	5·46	2	3·47	1	5·07
Length of ramus of lower jaw, soft parts preserved on anterior border	2	7·52	2	6·03	1	7·75
From gape* of mouth to anterior border of lower jaw	1	6·50	1	4·87		10·05
From anterior border of lower jaw to centre of tooth		10·75		10·12		5·00
From centre of tooth to gape of mouth.		7·75		6·75		5·05
Breadth of lower jaw at centre of tooth		2·31		2·69		1·75
Distance from extremity of rostrum to first anterior tooth		11·06		10·75		5·62
Distance from gape to end of teeth ...		1·02		1·37		1·40
Eye, perpendicular diameter, about ...		2·25		2·27		
Opening of blower, the two extremities slightly directed backwards, about...		4·50		4·50		3·25
Number of teeth in upper jaw		19		17		17

I should have liked to give also in this list the breadth of the rostrum at the anteorbital notches, as it would have supplied another important point for comparison; but the coverings prevented this; also I was not able to give the total length of each skull, owing to the occipital portion being cut off; but the length of the skulls from crest of nasals to anterior border of the rostrum, as well as the length of the ramus of each mandible, will supply this deficiency and offer us sufficient material for comparison.

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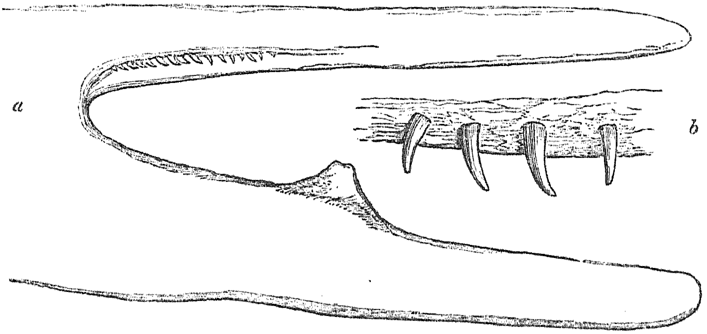
* The drying of the skin has been so unequal in the different specimens, and even on the two sides of the same skull, that the position of the gape cannot be fixed with precision.

Examining the skulls separately, we find that the one marked No. 1 is longer but narrower than No. 2. This is still more striking when we compare the two rostrums with each other, that of skull No. 1 being considerably narrower than that of skull No. 2. The same observation applies to the mandibles, which in No. 1 only widen very gradually and are much narrower all along than those of skull No. 2. In fact, if both skulls had been obtained separately I believe that they would probably have been assigned to two distinct species.



a. Side view of upper and lower jaws, covered with the dried skin, of No. 2 (aged male?), showing the row of small teeth above and the single large mandibular tooth. From a photograph.
b. Four of the upper teeth, with the whole of their roots exposed; natural size.

When the skull No. 1 was first examined by me, the sharp point of a tooth in each ramus of the lower jaw, when passing the finger over the gums, was discernible; but I doubt if this was to be felt before the gums were dried up.

In cutting a portion of the gums away, the apex of a very flat tooth, rather acutely triangular as far as visible, was exposed, which stands about one eighth of an inch above the upper surface of the ramus. This tooth is imbedded in a very narrow alveolar cavity situated near the posterior edge of the symphysis, the ramus here scarcely bulging out; this is still more obvious if we compare that portion of the ramus with that of skulls Nos. 2 & 3.

Above the posterior edge of the small tooth in the lower jaw, and which without doubt has to perform some function, notwithstanding that it is covered by the gum, a row of small conical teeth, the apices slightly incurved, begins on each side of the upper jaw, reaching within an inch of the gape of the mouth, which, however, may have somewhat retreated by the drying of the skin.

These small teeth are situated in a well-defined dental groove in the gums. There were 19 teeth on each side, of which, however, several are broken off. They are from 0·20 to 0·40 inch long, and occupied a line 6·12 inches in length, standing nearly the eighth of an inch apart. Of the whole series, the first or anterior tooth is the smallest, the succeeding ones gradually getting larger till the eighth, and then maintaining the same size to nearly their termination.

The crowns of the teeth stand at about the same level with the central line of the palate. The opening along the upper surface of the rostrum is still unclosed, thus showing that the animal is not so aged as the next specimen, No. 2.

I may here add that the rostrum in all three skulls is half an inch shorter than the mandible, and that it lies in a well-defined groove in the latter.

Skull No. 2.—The measurements of this skull, as far as I was able to obtain them, show that, as previously stated, it was not so elongate as the former, but somewhat broader and more massive in all its proportions. The rami of the mandible widen much sooner than those of the former; about 7 inches from their anterior extremity they expand considerably in order to form the alveolar cavity for a large tooth which here rises conspicuously on both sides, having a vertical position. This tooth has a compressed triangular shape, is $2\frac{7}{8}$ inches broad at its base on the line of the gums, and rises $1\frac{3}{4}$ inch above them.

On the inner side near the top it is slightly abraded, and on the outside broken considerably, so as to suggest that the animal used it for the purpose of defence or attack. This injury has taken place on both teeth, so that they have lost their point and show a ragged horizontal apex with a width of nearly a quarter of an inch.

From behind the tooth the rami expand very little as far as the gape.

A similar row of small teeth, described as occurring in the first specimen, exists also in this second skull; but there are apparently only 17 of them. Their position is exactly the same as in the foregoing, the first standing exactly above the posterior edge of the base of the large tooth in the lower jaw.

The teeth have the same form as those previously described, except that they are generally thicker; this becomes conspicuous with the 7th tooth, after which they gradually increase to the 13th, which is $\frac{1}{8}$ of an inch thick at its base and stands 0·45 inch above the gums. They then keep nearly the same size to the posterior end of the series.

As the space on which these 17 teeth stand is only 4·25 inches long, besides their greater stoutness they are far more crowded than in the first-described skull.

Owing to the fact that the gums have dried more thoroughly in this than in the two other skulls, in both of which the teeth stand erect with the curve of the apex directed inwards, the teeth in this skull are no longer in their normal position, but lie somewhat forwards on the palate.

The groove in the upper surface of the rostrum, between the premaxillaries, is filled by a convex ridge of dense bone with a small channel on each side. That this is only caused by age, and that it is neither a sexual nor a specific character, is proved by the fact that the next skull, No. 3, which is doubtless a young half-grown specimen of the same sex as the one under review, has this groove on the top of the rostrum still open, and thus resembles the skull No. 1, although in the latter that groove is narrower and more shallow.

Skull No. 3.—Assuming that the last-described skull belongs to an aged male, the measurements of the third skull under consideration must lead us to the conclusion that it is that of a young half-grown male. Beginning with the lower jaw, the same form as in the foregoing is observable, the rami expanding considerably as soon as we reach the neighbourhood of the alveolar cavity; and although the tooth in the same is only small, and stands only 0·25 inch above the edge of the ramus, that alveolar cavity is much more bulged out and has a different form from the first (or female?) skull described. The apex of the tooth was distinctly visible, and seemed to have already pierced the gums when the animal was alive.

The row of teeth in the upper jaw, however, which have the same form as in the skull No. 2, are smaller and somewhat more slender. They begin likewise above the posterior end of the alveolar cavity.

There are, as in the preceding skull, 17 teeth on each side, occupying a length of 2·48 inches. They stand more closely together than in the supposed female skull No. 1, thus also agreeing with the second skull in that respect.

In volume vi. of the Transactions of the New-Zealand Institute, Dr. Hector describes the lower jaw of a Ziphioid Whale under the title "Notice of a variation in the dentition of *Mesoplodon hectori*, Gray."

It is difficult for me to conceive by what process the tooth in the lower jaw which, in *Mesoplodon hectori*, stands at the anterior end of the ramus, could have travelled as far backwards as to stand now opposite the posterior edge of the symphysis. Hitherto I have believed that the position of the mandibular teeth was constant and a valuable specific character—an opinion which, as far as I am aware, is held by the most eminent cetologists, and which the observations I was able to make on the three skulls under review amply confirms. Moreover I wish to add that a comparison of these three skulls with the skull of *Mesoplodon hectori*, Gray, in the Canterbury Museum, and which is derived from an aged specimen, shows at a glance the distinct specific characters.

We are only at the beginning of the study of our Ziphioid Whales; and I have no doubt that year by year new material will come to hand; so that by the lumping of two distinct species into one, as attempted by Dr. Hector, and for which no tangible reason can be assigned, only confusion will be created.

The occurrence of hidden teeth in the gums of *Ziphius australis*, Burmeister, of which he gives a careful description in his exhaustive paper, "Descripcion detallada del *Epiodon australe*" in the 'Anales del Museo publico de Buenos Ayres,' part v. page 328, is a point of great interest. On first thought, one might assume that that specimen was so young that the teeth had not yet pierced the gums, and that animals belonging to that species when full-grown would be possessed of a row of teeth in each jaw resembling those of *Mesoplodon grayi*. However, two (and what I think fatal) objections have to be urged against such a theory.

The skull of No. 3 belongs doubtless to a younger specimen than

Ziphius australis; nevertheless the row of teeth standing above the gums was perfectly formed; and, secondly, the specimen of *Ziphius novæ zealandiæ*, of which the Canterbury Museum possessses a complete skeleton, was an aged female and obtained in the flesh, but did not show the least trace of any row of small teeth above the gums.

I have examined carefully the gums of the new species in both jaws, where no teeth were visible, but without the least success, no hidden teeth being in existence anywhere.

Finally I propose to designate this new Cetacean by the specific name of *grayi* in memory of the late Dr. J. E. Gray, to whom New Zealand is so much indebted for his contributions towards the better knowledge of its natural history.

Conclusion.

In summing up the evidence which the three skulls under review present to us, the following points may be accepted as fully established:—

1st. That there exists a Ziphioid Whale in the New-Zealand seas which possesses a mandibular tooth at the posterior edge of the symphysis, either hidden below the gum or standing conspicuously above it, according to age or sex.

2nd. That the skull of one of the sexes (probably the female) is longer but narrower and lower than that of the opposite (probably the male) sex—the latter possessing also a large triangular compressed tooth rising above the gum, which in the other (probably female) sex is much smaller and almost hidden below the gum.

3rd. That both sexes possess permanently in the upper jaw a row of small conical teeth with the apex slightly incurved, which, although only rooted in the gums, have to perform important functions in the nourishing-process of the animal.

3. On some additional Species of Birds from St. Lucia, West Indies. By P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society.

[Received November 30, 1875.]

(Plate II.)

The Rev. J. E. Semper, of St. Lucia, who has already done so much to make us acquainted with the ornithology of that island, has lately forwarded to me a third collection of birds, which I have now the pleasure of exhibiting. It contains examples of eight species not included in my two former articles on this subject*, and among them two specimens of a very remarkable form, which appears to be referable to a new genus of Mniotiltidæ. The following is a list of the species, with the local names as given by Mr. Semper:—

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* P. Z. S. 1871, p. 263, and 1872, p. 647.

1. *Thryothorus mesoleucus*, sp. nov. Local name "Rossignol."
2. *Leucopeza semperi*, sp. et gen. nov. Local name, "Pied-blanc."
3. *Setophaga ruticilla* (Linn.). Local name, "Carrougette."
4. *Progne dominicensis* (Gm.). Local name, "White-breasted Swallow."
5. *Euphonia flavifrons* (Sparrm.). Local name, "Moisson à couleurs."
6. *Phonipara bicolor* (Linn.). Local name, "Grass-sparrow."
7. *Ægialitis semipalmata* (Bp.) Local name, "Bécasse à collier."
8. *Tringa fuscicollis* (Vieill.). Local name, "Bécasse."

I append descriptions of the two new species.

THRYOTHORUS MESOLEUCUS, sp. nov.

Supra terreno-brunneus, alis caudaque nigro transfasciatis, uropygii plumis laxis, albo sub apicem punctatis: subtus pure albus hypochondriis et crisso fulvis, hoc indistincte nigro maculato: rostro superiore corneo, inferiore albicante, pedibus fuscis: long. tota 4·0, *alæ* 2·0, *caudæ* 1·5, *rostri a rictu* ·8.

Hab. ins. St. Lucia Antillarum (*Semper*).

Mus. P. L. S.

Obs. Minor statura quam *T. martinicensis*, et rostro longiore tenuiore et magis incurvo: quoad colores abdomine albo satis diversus.

LEUCOPEZA SEMPERI, gen. et sp. nov. (Plate II.)

Leucopeza*, *gen. nov. ex familia Mniotiltidarum, ad* Helmintherum, Helminthophagam *et hujusmodi genera spectans, rostro fere simili, sed alis rotundatis, remige tertio et quarto longissimis, secundo quintum æquante, primo quam sextus paulo breviore distinguendum. Ptilosis fere unicolor, cineracea, immaculata. Pedes fortes. Tarsi elongati. Cauda paulum rotundata.*

LEUCOPEZA SEMPERI, sp. nov. (Plate II.)

Cineraceus unicolor, dorso postico in olivaceum trahente, subtus pallidior, medialiter albescens, ventre medio fere pure albo: rostro corneo, pedibus albis: long. tota 5·7, *alæ* 2·7, *caudæ* 2·2, *tarsi* 0·9, *rostri a rictu* 0·8.

Hab. ins. St. Lucia Antillarum (*Semper*).

Mus. P. L. S.

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* Λευκὸς, *albus*, et πέζα, *pes*—ex nomine vulgari "*Pied-blanc*."

4. Note on the Spoonbill of the Argentine Republic. By W. H. Hudson, C.M.Z.S.

[Received November 17, 1875.]

It has been said that Spoonbills "obtain their food by shovelling in the mud with their beaks." This is perhaps true of the European bird; the Spoonbills which I have observed feeding certainly obtained their food exclusively from the water, as Flamingoes do.

In reference to the Rose-coloured Spoonbills of America, I believe ornithologists have been mistaken in referring them all to one species.

Whether two or only one species existed was a moot question a century ago: it has been decided that there is but one, the *Platalea ajaja*, and that the paler-plumaged birds, with feathered heads and black eyes, and without the bright wing-spots, the tuft on the breast, horny excrescences on the beak, and other marks, are only immature birds. Now it is quite possible the young of *P. ajaja* resembles the common Rose-coloured Spoonbill of Buenos Ayres; but in that country, for one bird with all the characteristic marks of an adult *P. ajaja*, we meet with not less, I am sure, than two or three hundred examples of the paler bird without any trace of such marks.

This fact of itself might incline one to believe that there two distinct species, and that the common *Platalea* of Buenos Ayres inhabits the temperate regions south of the range of the true *P. ajaja*.

Other facts confirm me in that opinion. A common Spoonbill was kept tame by a friend of mine seven years, at the end of which time it died without having acquired any of the distinguishing marks of *P. ajaja*.

I have dissected three examples of the latter species, and observed in them the curiously formed trachea recently described by Mr. Garrod*. I have shot perhaps a hundred specimens of the common bird; for they are extremely abundant with us. Of these I have opened about thirty, but in none of them did I find this form of trachea. I am therefore convinced that we have two distinct species of rose-coloured Spoonbill, inhabiting different portions of the continent.

5. On Peruvian Birds collected by Mr. Whitely. By P. L. Sclater, M.A., Ph.D., F.R.S., and Osbert Salvin, M.A., F.R.S.—Part IX.†

[Received December 8, 1875.]

(Plate III.)

The ninth collection of Mr. Whitely's Peruvian birds, now before us, has been formed in the same district of High Peru as the last was. It contains examples of sixty-five species.

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* P. Z. S. 1875, p. 297.

† For Part VIII. see P. Z. S. 1874, p. 677.

Maramora, Potrero, and Huiro are villages in the valley of Santa Anna, north of Cuzco, at elevations of 4000, 4500, and 4800 feet respectively. The other localities have been mentioned in our previous papers on this subject.

The following is a complete list of the species :—

	Nom. Av. Neotr.	Localities.
	page	
1. *Parula pitiayumi* (Vieill.)	8	Huiro.
2. *Geothlypis velata* (Vieill.)	10	Huiro, Maranura.
3. *Setophaga verticalis*, Lafr. et d'Orb.	10	Huiro, Potrero.
4. *Vireosylvia olivacea* (Linn.)	11	Maranura, Huiro.
5. *Atticora cyanoleuca* (Vieill.)	14	Maranura.
*6. *Conirostrum*, sp. inc.	...	Maranura.
*7. *Euphonia*, sp. inc. ♀	...	Maranura.
8. *Tanagra cœlestis*, Spix	21	Huiro, Potrero.
9. —— *olivina*, Scl.	21	Maranura.
10. —— *darwini*, Bp.	21	Paucartambo.
11. *Ramphocœlus atrosericeus*, Lafr. et d'Orb.	21	Maranura, Potrero.
12 *Tachyphonus melaleucus* (Sparrm.)	23	Maranura, Huiro, Potrero.
13. *Saltator magnus* (Gm.)	26	Huiro.
14. *Orchesticus ater* (Gm.)	26	Potrero, Huiro.
15. *Spermophila gutturalis* (Licht.)	28	Maranura.
16. *Coryphospingus cristatus* (Gm.)	30	Potrero.
17. *Phrygilus atriceps* (Lafr. et d'Orb.)	31	Paucartambo.
18. —— *fruticeti* (Kittl.)	31	Paucartambo.
19. *Poospiza cæsar*, Scl. and Salv.	30	Paucartambo.
20. *Ostinops atrovirens* (Lafr. et d'Orb.)	35	Huiro.
21. *Dolichonyx orizivora* (Linn.)	37	Paucartambo.
22. *Cyanocorax incas* (Bodd.)	39	Huiro.
23. *Muscisaxicola rubricapilla*(Ph. et Landb.)	44	Tinta.
24. —— *fluviatilis*, Scl. et Salv.	44	Potrero.
25. *Todirostrum cinereum* (Linn.)	45	Maranura, Potrero.
26. *Euscarthmus wuchereri*, Scl. et Salv.	45	Maranura.
27. *Elainea pagana* (Licht.)	48	Maranura.
28. —— *gigas*, Scl.	48	
29. —— *albiceps* (Lafr. et d'Orb.)	48	Huiro, Maranura, Potrero.
*30. —— *placens*, Scl.	48	Maranura.
31. —— *obscura* (Lafr. et d'Orb.)	49	Huiro.
*32. *Sublegatus griseocularis*	...	Maranura.
33. *Myiozetetes cayennensis* (Linn.)	49	Huiro.
34. *Myiodynastes chrysocephalus* (Tsch.)	50	Huiro.
35. *Myiobius nævius* (Bodd.)	51	Potrero.
36. *Myiarchus erythrocercus*, Scl.	52	Maranura.
37. *Tyrannus melancholicus*, Vieill.	53	Huiro.
38. *Placellodomus striaticeps* (Lafr. et d'Orb.)	65	Paucartambo.
*39. *Thamnophilus melanchrous*, sp. nov.	...	Huiro, 4800 feet.
40. —— *radiatus*, Vieill.	70	Huiro, Maranura.
41. *Formicivora rufatra* (Lafr. et d'Orb.)	72	Maranura.
42. *Phaethornis guyi* (Less.)	78	Huiro.
43. *Panoplites matthewsi* (Bourc.)	83	Huiro.
44. *Acestrura mulsanti* (Bourc.)	85	Huiro.
45. *Steganura addæ* (Bourc.)	86	Huiro.
*46. *Eupetomena hirundo*, Gould.	...	Huiro.

	Nom. Av. Neotr.	Localities.
	page	
47. *Leucippus chionogaster* (Tsch.)	91	Huiro.
48. *Chlorostilbon prasinus* (Less.)	94	Huiro.
49. *Crotophaga ani*, Linn.	107	Maranura, Potrero.
50. *Diplopterus nævius* (Gm.)	107	Maranura.
51. *Piaya cayana* (Linn.)	108	Huiro.
*52. *Bolborhynchus andicola* (Finsch)	...	Paucartambo.
53. *Tinnunculus sparverius* (Linn.)	121	Maranura, Potrero.
54. *Phalacrocorax brasilianus* (Gm.)	124	Laguna de Tungasuca.
55. *Querquedula cyanoptera* (Vieill.)	129	Laguna de Tungasuca.
56. *Dafila spinicauda* (Vieill.)	130	Laguna de Tungasuca.
57. *Spatula platalea* (Vieill.)	130	Laguna de Tungasuca.
*58. *Columba albipennis*, sp. nov.	...	Paucartambo.
59. —— *rufina* (Temm.)	132	Maranura.
60. *Metriopelia melanoptera* (Mol.)	132	Tinta.
61. *Chamæpelia griseola* (Spix)	133	Maranura.
62. *Leptoptila ochroptera*, Pelz.	133	Potrero, Huiro.
*63. *Gallinago andina*, Tacz.	...	Tinta.
64. *Podiceps caliparæus*, Lesson.	150	Laguna de Tungasuca.
65. —— *rollandi*, Q. et G.	150	Laguna de Tungasuca.

6. Conirostrum, sp. inc.

A single skin of what is probably the female of a new *Conirostrum*, allied to *C. albifrons* or possibly of a new *Dacnis*.

7. Euphonia, sp. inc.

Two skins of the female of a thick-billed *Euphonia* of the group allied to *E. violacea*, probably of *E. laniirostris* (Lafr. et d'Orb.).

30. Elainea placens, Sclater.

This brings the range of this species down to Peru. We have compared skins from Mexico, Guatemala, Veragua, Panama, Bogota, and Ecuador. The last-named (*E. implacens*, Sclater, *olim*) agree with the Peruvian in being rather darker on the back; but a Bogota skin is barely different in this respect from Sclater's Mexican type.

32. Sublegatus griseocularis.

This Tyrant bird, of which Mr. Whitely sends a pair from Maranura, is very closely allied to the Venezuelan *S. glaber*, but is recognizable by its shorter smaller bill, shorter crest, and the paler colour of the back. Sclater's collection contains a single immature example of the same form from Mendoza (*Weisshaupt*), labelled "*Elainea griseocularis*, Landbeck;" and there is a second skin from the same source in Salvin and Godman's collection. Whether this name has ever been published or not we are not sure; but we adopt it as a designation of this allied species, which is generally of the same form as its northern congener.

39. THAMNOPHILUS MELANCHROUS, sp. nov. (Plate III.)

Ater; interscapulii macula magna, campterio et tectricum marginibus albis: ventre lineis quibusdam et marginibus angustis albis variegato: cauda nigra, rectricum trium lateralium apicibus et macula in rectricis utrinque extimæ pogonio externo medio albis: rostro et pedibus nigris: long. tota 6·0, *alæ* 2·8, *caudæ rectr. med.* 2·4, *ext.* 2·1.

Hab. Peruvia alta propè Huiro (*Whitely*).

Ob. Species quoad formam et colores *Thamnophilo asperisiventri* maximè affinis, sed ventre nigro diversa.

46. EUPETOMENA HIRUNDO, Gould, Ann. N. H. ser. 4, vol. xvi. p. 370 (1875).

Mr. Whitely sends the following notes on this interesting new discovery:—

"I found these birds at Huiro in the valley of Santa Ana, at an elevation of 4800 feet; they rarely approach a flower, but appear to take their food hawking about in the air, in the manner of Swallows—in fact, at first sight might be easily mistaken for such birds. Length 6⅞ inches, bill 1 inch, wing 3 inches; eyes and bill black; legs, toes, and claws black."

52. BOLBORHYNCHUS ANDICOLA (Finsch).

Psittacula andicola, Finsch, P. Z. S. 1874, p. 90; Scl. et Salv. P. Z. S. 1874, p. 679.

A third example of this little Parrot from Paucartambo. On the whole we think this species better referred to the genus *Bolborhynchus*, being unquestionably allied to *B. orbignesius*.

58. COLUMBA ALBIPENNIS, sp. nov.

Columba maculosa, Scl. et Salv. P. Z. S. 1869, p. 600.

Supra fuscescens, capite et collo postico vinaceo lavatis: dorso postico et tectricibus supracaudalibus columbino-griseis: tectricibus alarum minoribus albido terminatis, tectricibus majoribus albo late terminatis, fasciam alarem distincta formantibus: alis fusco-nigris: cauda fusco-grisea, fascia lata terminali nigra: subtus griseo-cærulea, collo antico (nisi in gula) et pectore vinaceo indutis: alis subtus pallide columbino-griseis: rostro nigro, basi flavido, pedibus rubris: long. tot. 14·5, *alæ* 9·0, *caudæ* 5·0, *rostri a rictu* 1·1, *tarsi* 1·2.

Hab. Peruvia alta, Pitumarca (*Whitely*); Bolivia (*D. Forbes*).

Obs. Sp. *C. maculosæ* affinis, sed fascia alari alba, corpore subtus grisescentiore et pagina alarum inferiore pallidiore grisea distinguenda.

This species, though closely allied to *Columba maculosa*, appears to take its place in Bolivia and Peru, from both of which countries we possess specimens. The true *C. maculosa* is found further south; we have specimens of it from Mendoza (*Weisshaupt*), and from the Rio Negro, where Mr. Hudson obtained it. [Cf. P. Z. S. 1872, p. 545.]

63. GALLINAGO ANDINA, Tacz.

Gallinago frenata, Scl. and Salv. P. Z. S. 1869, p. 156.

G. andina, Tacz. P. Z. S. 1874, p. 561.

Having compared one of Mr. Whitely's skins with M. Taczanowski's typical specimens, we find them to be identical, and, moreover, that the bird we attributed in a former paper to the common *G. frenata* of Eastern South America really belongs to a distinct species, as shown by M. Taczanowski. Without placing much stress upon differences of coloration (a variable and unsatisfactory character in the Snipes), the shortness of the tarsi in *G. andina* at once shows its distinctness from *G. frenata*. The other dimensions are nearly the same in the two species: the bills appear to be shorter in *G. andina*; but upon this character no value can be placed. Mr. Whitely (P. Z. S. 1869, p. 156) says that "the legs and toes are brownish flesh-colour," *i. e.* in life. In the skin they are much paler than those of *G. frenata*; so that possibly a distinction here exists between the two birds.

6. Notes on some Fijian Birds, including Description of a new Genus and Species. By OTTO FINSCH, Ph.D., C.M.Z.S., &c.

[Received December 8, 1875.]

The Museum Godeffroy at Hamburg has received a small collection of birds from Mr. Theodor Kleinschmidt, of Ovalau, upon which I beg leave to make a few remarks. I have also the pleasure of describing a curious new Malurine form, which offers a very interesting addition to the avifauna of the Fijis and Central Polynesia.

HALCYON SACRA, Gm.

One specimen with the blue of the head surrounded by a band of bright buff; the nuchal collar, sides of vent and flanks, the under wing- and tail-coverts also strongly tinged with buff. Apparently a young bird, agreeing with our descriptions (Finsch & Hartl. 'Orn. Centr.-Polyn.' p. 34, "jüngerer Vögel von Viti") and that of the "young" by Sharpe (Kingf. pl. 85).

COLLOCALIA SPODIOPYGIA, Peale.

Two specimens, agreeing in every respect with specimens from the Navigators' (Upolu).

MYZOMELA JUGULARIS, Peale.

An old male in full plumage; rump and upper tail-coverts scarlet; throat and crop pale orange, remainder of underparts yellowish.

DRYMOCHÆRA, gen. nov.

(δρυμὸς, *sylva*; χαίρω, *gaudeo.*)

The systematic position of this new and curious Malurine form is between *Camaroptera* and *Orthotomus*. The former has a much shorter, rounded tail; *Orthotomus*, on the contrary, has a cuneate tail, whereas in this genus the tail is only graduated. The wings are a little longer and less rounded than in *Orthotomus*, the fifth and sixth quills being the longest, the fourth and seventh scarcely shorter, the first considerably shortened, half of the fifth; the bill is straight, attenuated and subulate, a little more robust than in *Orthotomus*, as are likewise the legs and feet.

DRYMOCHÆRA BADICEPS, sp. nov.

Upper parts olive-brown, tinged with reddish brown on the rump and upper tail-coverts; head above to the nape chestnut-reddish; a narrow greyish superciliary stripe, extending to the temporal region, and bordered below by a narrow dark line, which runs from the lores through the eyes; quills and tail dark olive-brown; under parts, from chin to the middle of vent white; sides of head, neck, and breast washed with brownish-grey, remainder of underparts pale earthy brown; bill dark brown; feet pale brown.

al.	caud.	rect. ext.	culm.	rict.	tars.	dig. med.
$23'''$	$22'''$	$17'''$	$5\frac{1}{2}'''$	$8'''$	$9\frac{1}{2}'''$	$6'''$

Mr. Kleinschmidt discovered this remarkable little bird during an expedition into the interior of Viti-Levu, but could obtain only a single specimen.

MYIOLESTES NIGROGULARIS, Layard.

Lalage! nigrogularis, Layard, P. Z. S. 1875, p. 149.

Mr. Layard has described this interesting bird wrongly as a *Lalage*: it is a typical *Myiolestes*, agreeing in its generic characters with our *M. heinei* (H. & F., P. Z. S. 1869, p. 546) from Tongatabu. Mr. Layard, strangely enough, does not mention this characteristic bird in his last paper on Fijian birds (P. Z. S. 1875, p. 423).

Mr. Kleinschmidt obtained but one specimen of this species at Ovalau.

RHIPIDURA ALBOGULARIS, Layard (*nec* Less.).

One specimen, agreeing very well with Mr. Layard's description (P. Z. S. 1875, pp. 29, 434). This is a very excellent and peculiar species, not to be confounded with any of its allies.

MYIAGRA CASTANEIVENTRIS, Verr.

One old male as figured (F. & H. Orn. Centr.-Pol. t. ix. f. 2), and corresponding in every respect with specimens from the Navigators' Islands.

7. On the *Cæcum Coli* of the Capybara (*Hydrochœrus capybara*). By A. H. GARROD, M.A., F.Z.S., Prosector to the Society.

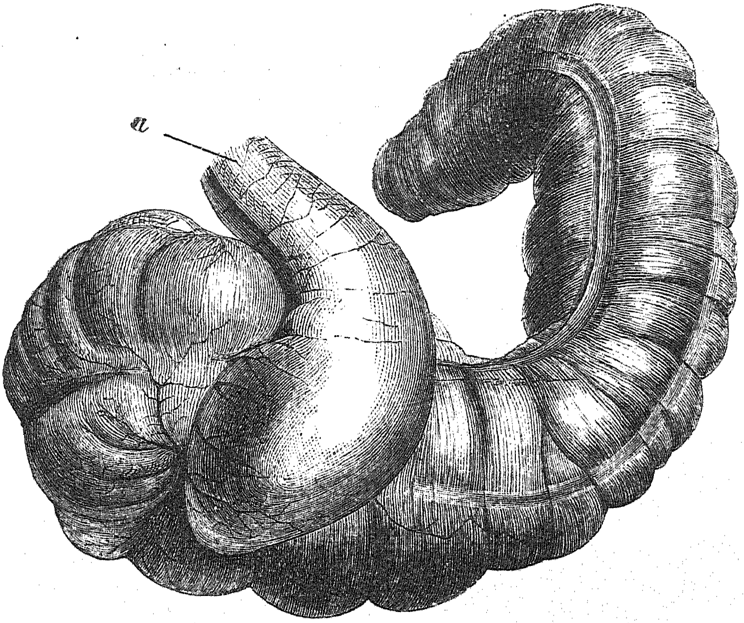
[Received December 9, 1875.]

In no work on anatomy with which I am acquainted can I find any reference to the peculiarities of the cæcum coli of the Capybara, which are but an extreme exaggeration of those observed in many of the allied forms.

In most of those mammals in which a cæcum is present, that organ is simply a direct continuation backwards of the colon beyond the place of junction of the small and large intestines. In some Rodents, however, this is not the case, the sacculated cæcum in them not being a direct continuation of the larger gut, but a lateral diverticulum from a true but simple cæcum.

In his account of the anatomy of *Capromys fournieri* *, Prof. Owen remarks that the arrangement at the ilio-colic junction is such that "the two orifices of the blind intestine [that into the ileum and that into the colon] are analogous to the cardia and pylorus of the stomach;" and in his 'Anatomy of Vertebrates'† the same illustrious author tells us, with reference to the same animal, that "the cæcum is marked off from the colon by a valvular structure, similar to that at the end of the ileum." This is an approximation to the condition which obtains in the animal under consideration.

Fig. 1.



Sacculated and simple cæca of the Capybara. The continuation of the colon is seen at *a*. The small intestine at its termination cannot be seen, being hidden in the proximal angular bend of the sacculated cæcum.

In the Capybara the small intestine enters the enormous sacculated cæcum at about an inch from its open extremity, and its relations to it are not in any way peculiar. The sacculated cæcum is nearly two feet long, and is traversed by four longitudinal bands. At its open end, which is an inch beyond (that is, further from the cæcal extremity than) the ileo-cæcal valve, it is constricted by a circular sphincter muscle, which forms the orifice of communication with the rest of the cylindrical large intestine. The colic surface of this sphincter is situated *in the side of* the colon, three inches from the blind extremity of a true, simple, thick-walled, slightly pyriform cæcum, which is directly continuous with the colon, and is indistinguishable from it in structure. This second cæcum is, as indicated above, three inches from the extreme end to the centre of the orifice by which it communicates with the sacculated one. Superficially its

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* P. Z. S. 1832, p. 70.

† Vol. iii. p. 425.

Fig. 2.

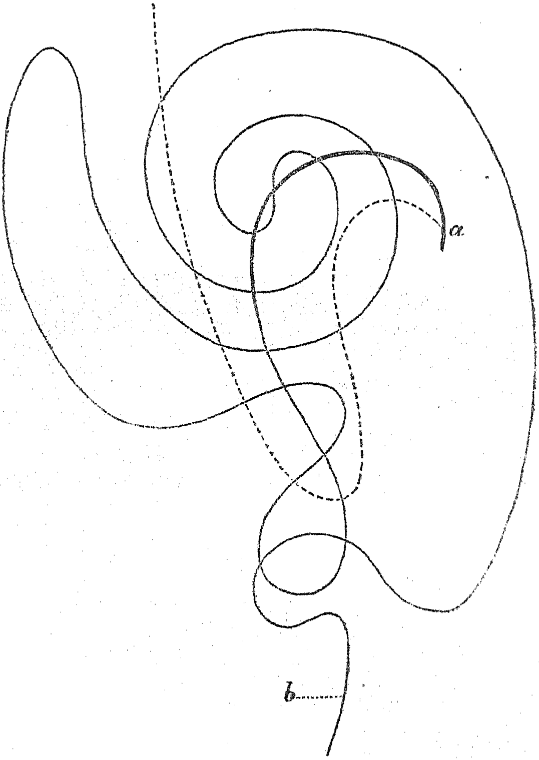

Diagram of the convolutions of the colon in the Capybara. The dotted line represents the cæcum springing from the side of the dilated end of the large intestine, and running forward to the diaphragm. *a*, ileo-cæcal valve; *b*, rectum.

longitudinal muscular coat is strongly marked, covering it perfectly uniformly.

The ileo-cæcal valve is linear and longitudinal; it projects a short distance into the sacculated cæcum from above as a tube with slightly turned lips, of which the inferior is a little the longer and larger. There are some thickened gland-patches in the sacculated cæcum, and a large one in the colon, at the margin of the sphincter which is towards the continuation of the large intestine; three or four others are situated irregularly in the walls of the true cæcum.

The disposition of the colon is peculiar and interesting. The accompanying sketch (fig. 2, p. 22) will explain it best. It was taken from the view obtained of them as the animal lay on its back. As is well known, the large intestine commences in the left hypochondriac region, the true cæcum capping the end of the sacculated one anteriorly. The gut then, with a curve to the right, runs back to the hypogastric region, where, with a reversed figure-of-eight twist, it gets into the normal position of the ascending colon. It so reaches the right hypochondriac region, and then commences to form, in the transverse colon, coils very similar to, though on a smaller scale than those in *Indris* among the Lemurs and in the Artiodactylate Ungulata, the much-developed loop being twisted on itself to the left side. After reaching the left hypochondrium the descending colon continues straight to the sigmoid flexure, which is strongly developed, and thence to the rectum.

The sacculated cæcum being bound to the first part of the colon by bands of equal length (about 2½ inches), follows the course of that canal, and is therefore doubled on itself, not, as Prof. Owen remarks, occupying the posterior half of the abdomen, but running forwards towards the diaphragm, above the colon, till its caput arrives in the right hypochondriac and epigastric regions, where the ruminant-like coil above referred to is strongly bound to it on its under or ventral surface.

Neither in *Cavia, Dolichotis, Capromys,* nor in any of the allied forms with which I am acquainted, does the strong sigmoïd curve of the large intestine, at the commencement of the sacculated cæcum, develop into a true secondary cæcum in the manner that it does in the Capybara.

Whilst on the subject of the viscera of the Capybara, the following measurements of those of an adult male will not be out of place—small intestine 21 feet, large intestine 6 feet 7 inches, cæcum 1 foot 10 inches.

The liver is comparatively simple. The gall-bladder is pyriform, situated in a cystic fossa, not reaching the free margin of the gland. The right central lobe is slightly more bulky than the left lateral, which is more than twice the size of the left central, which, again, is somewhat larger than the caudate. The spigelian lobe is minute, and bifid as in so many Rodents.

8. Contributions to Morphology. Ichthyopsida.—No. 1. On *Ceratodus forsteri*, with Observations on the Classification of Fishes. By Prof. T. H. Huxley, Sec. R.S.

[Received January 4, 1876.]

Two specimens of *Ceratodus forsteri* have come into my possession within the last two years. The first was kindly placed at my disposal by the Secretary of this Society some time ago; but I was unwilling to dissect it until I had a second. This desideratum was supplied by my friend Sir George MacLeay, who, on a recent visit to Australia, was kind enough to undertake to obtain a *Ceratodus* for me, and fulfilled his promise by sending me a very fine and well-preserved fish, rather larger than the first. The first was 32 inches long, the second only 30 inches, though a considerably stouter fish.

I need hardly say that I have little to add or qualify in the general description of the exterior structure given by so accomplished and experienced an ichthyologist as Dr. Günther*. Only in one point do I find my interpretation of the facts widely discrepant from his; and that is in regard to the position of the external nostrils.

Dr. Günther says, "As in *Lepidosiren*, there are two nasal apertures on each side, both being situated within the cavity of the mouth."

That anterior nasal apertures should be situated, in any sense, "within the cavity of the mouth" would be so singular a deviation from the otherwise universal rule, that the anterior nares of vertebrated animals are situated outside the mouth, on the surface of the head, that conclusive evidence must be producible before the anomaly can be admitted to exist; and, so far as my observations go, that conclusive evidence is not only wanting, but the contrary is demonstrable.

In *Ceratodus*, it is easily seen that the anterior nares are not occluded when the mouth is shut by the apposition of the edges of the mandible to the palate. The anterior nares, in fact, lie altogether outside and in front of the contour of the mandibles, on the under concave surface of the anterior part of the head. The median portion of the margin of this region of the head must not be confounded with the upper lip, with which it has nothing to do. The maxillary portion of the upper lip is, in fact, represented only by a fold of the integument, which begins on the outer side of the anterior nostril, and extends back to the angle of the gape, where it passes into the lower lip. The præmaxillary, or internasal, portion of the upper lip is represented by a delicate fold of the integument, disposed in a transverse arch in front of the vomerine teeth, which it separates from the inner boundary of the anterior nares. The outer and posterior portion of the lower lip is produced into a free process, which is folded back against the jaw, and extends for about two thirds of the distance from the angle of the mouth to the symphysis, ending by a rounded free edge.

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* "Description of *Ceratodus*," Phil. Trans. pt. ii. 1871.

Thus the anterior nares can in no sense be said to open into the cavity of the mouth, inasmuch as they lie outside the præmaxillary portion of the upper lip, and are not enclosed by the maxillary portion of that lip. They are not even placed between the upper and the lower lips, inasmuch as the vaulted flap, on the underside of which they lie, is not the upper lip, but the anterior part of the head.

In *Lepidosiren*, the anterior nares are closer to the anterior margin of the head than in *Ceratodus*, and the præmaxillary lip is represented only by a papillose ridge, in which the integument of the underside of the head, between the anterior nares, terminates posteriorly. Otherwise the disposition of the nostrils is quite as in *Ceratodus*; and when the mouth is shut, the nostrils open on the underside of the head, in front of it and of the rudimentary præmaxillary portion of the upper lip.

The disposition of the nasal apertures in the Dipnoi is essentially Selachian *. In the common Dogfish (*Scyllium*), for example, the anterior contour of the head answers to the anterior contour of the head of *Ceratodus*. The mandibular and maxillary lips are similarly disposed; and the external nares are placed on the sides of the head in a similar position. But the præmaxillary part of the upper lip is much larger and more prominent; and its outer edges (septal alæ), instead of being continued into the maxillary lip, to form the floor of the nasal passage, are separated from it by a fissure, which communicates with the nasal cavity. This fissure is overlapped by the septal alæ; and thus an incomplete nasal passage, which opens posteriorly into the cavity of the mouth, is constituted.

Still more instructive is the comparison of the nasal passages of *Ceratodus* with those of *Cestracion* and *Chimæra*. In *Cestracion*, the external nostrils lie just outside the mouth, the lower lip coming into contact with the maxillary and præmaxillary portions of the upper when the mouth is shut. The anterior end of the maxillary lip is folded in, and passes into the external part of the *ala nasi*, which has a thickened edge, and ends in a continuation of the free fold of the lip. The inner *ala nasi* is the outer part of the internasal or præmaxillary part of the upper lip. It also ends in a free edge, which is rolled inwards. The septal ala and the maxillary ala do not unite; but a groove is left between their convex edges, which answers to part of the groove which leads from the nose into the mouth in Dogfish and other Plagiostomes. But the greater part of this groove is represented by a canal formed by the convoluted septal ala, which is open on its dorsal aspect, and communicates, in front, with the cavity of the olfactory sac. Behind, the free edge of the septal ala has a curious fringe; and when the mouth is shut, this fringe overlaps the edge of the mandible. The free edge of the septal ala bounds a large opening, the posterior nostril, which is situated, as in *Ceratodus*, at the point of junction between the vomerine and the palatine teeth. Consequently, when the mouth is shut, there is a free passage for water through this incompletely closed nasal canal.

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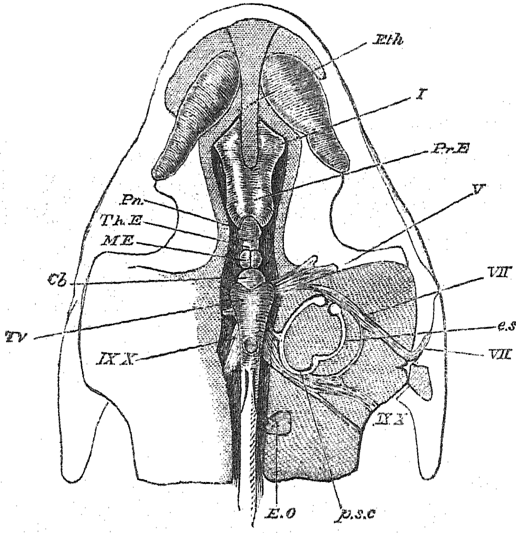
* See the excellent observations of Gegenbaur, 'Kopfskelet der Selachier,' p. 224 *et seq.*

An arrangement of a very similar character exists in *Chimæra*. Here the nasal septum is very narrow, but widens out below, where, as the præmaxillary lip, it overlaps the vomerine teeth. The free edge of the septal ala is curved in, as in *Cestracion*. Meeting it is an inward process of the maxillary lip, which abuts against the septal ala in the same way as the maxillary ala does in *Cestracion*. Outside this, again, is another flap-like process of the maxillary lip, which overhangs the foregoing when the maxillary lip is in place. Between the præmaxillary lip and the maxillary lip is the nasal passage, open ventrally as in *Cestracion*; and an interval between the vomerine and palatine teeth above and the mandibular tooth below (the posterior nostril) places this passage in free communication with the oral cavity.

It is obvious that if the septal and the maxillary alæ in *Scyllium*, *Cestracion*, and *Chimæra* united along the middle line, such a nasal passage as exists in *Ceratodus* would be the result. Compared with

Fig. 1.



Ceratodus forsteri. Dorsal view of the brain *in situ*.

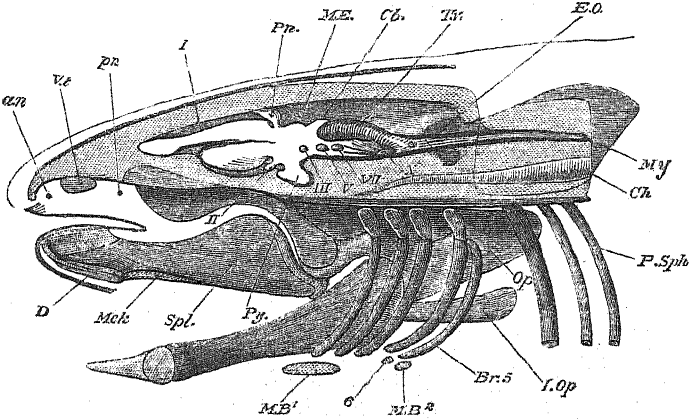
Pr E, *lobus communis* of the prosencephalon; *Th.E*, Thalamencephalon; *Pn*, pineal gland; *ME*, mesencephalon (the median groove is somewhat too strongly marked); *Cb*, cerebellum; *Tv*, tela vasculosa over the fourth ventricle; *e.s.c*, *p.s.c*, external and posterior semicircular canals; I, V, VII, IX, X, cerebral nerves; *E.O*, exoccipital ossification. The general contour of the chondrocranium is given; on the right side the cartilage has been sufficiently removed to show the anastomosis of the seventh and ninth nerves, the auditory organ, and other deep-seated parts. With respect to this and the other figures, I may remark that my object has been to make accurate diagrams drawn to scale, and not pictures.

Ceratodus, the Elasmobranchs mentioned are hare-lipped; and as regards the position of the external nostrils, *Cestracion* and *Scyllium* are intermediate between *Chimæra* and *Ceratodus*.

It may be asked, what is the use of a nasal passage and of internal nares in a purely branchiate animal? Without actual experiment it is hard to give a definite answer to this question; but I will venture upon two suggestions. In the first place, these communications between the cavity of the mouth and the exterior must permit slow respiration to take place when the jaws are shut; and it is easy to imagine that this, under many circumstances, may be an advantage.

In the second place, the large olfactory sacs of these animals suggest that the sense of smell is of value to them; and the communication of the nasal passages with the mouth must enable them to do what they could not do otherwise—namely, accelerate the rapidity of the contact of odoriferous particles with the Schneiderian membrane at will. The fish with posterior nasal apertures, in fact, can "sniff" effectually, while that operation could only be very imperfectly performed by compression and dilatation of the walls of the olfactory sacs in the absence of any second opening. Probably the second opening so generally present in the olfactory sacs of the Teleostei, and the naso-palatine canal of the Marsipobranchs, have a similar

Fig. 2.



Ceratodus forsteri. Left lateral view of the brain *in situ*.

The details of the structure of the dorsal region of the spinal column are omitted. *Ch*, notochord; *E.O*, exoccipital ossification; *P.Sph*, parasphenoid; *V.t*, vomerine teeth; *an*, *pn*, positions of the anterior and posterior nares; *Op*, operculum; *I.Op*, interoperculum; *Spl*, splenial, and *D*, dentary bones of the mandible; *Mck*, Meckel's cartilage; *M.B*^{1}, *M.B*^{2}, anterior and posterior mesobranchials; *Br*. 5, fifth branchial arch; 6, nodule of cartilage, which possibly represents a rudimentary sixth arch; *Py*, pituitary body. The other letters have the same signification as in the preceding figure. The suprascapular bone is shown in place; and its contour is given as if the anterior part of the vertebral column were transparent.

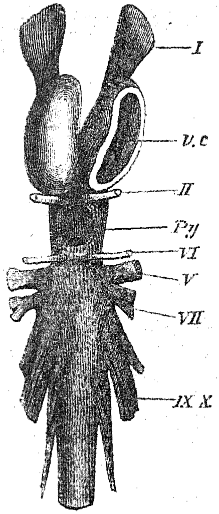
physiological significance. In *Ceratodus* there is the further physiological relation to aerial respiration; and in all the higher Vertebrata the nasal passages are concerned in sniffing and breathing.

With respect to the internal structure of *Ceratodus*, I shall confine my remarks, in the present communication, to the brain, the skull, and the pectoral limbs. *Ceratodus* is, in fact, the most surprisingly suggestive animal I have ever had occasion to study; and the attempt to comprehend the morphological significance of the organs I have mentioned has led me so far, that I must defer the consideration of other parts of its organization to another occasion.

I. *The Brain.*

I had no great hope of finding the brain in a state fit for examination in my specimen of *Ceratodus*; and in fact the cerebral substance and that of the nerves are in a very friable condition. But, by great good fortune, the *pia mater* is so very dense and tough, that it has held the cerebral substance in place; and thus not only the external form, but somewhat of the internal structure of the brain could be satisfactorily determined.

Fig. 3.



Ceratodus forsteri. Underview of the brain (nat. size).

I, olfactory, II, optic, VI, third nerve (?); V, VII, IX, X, roots of the trigeminal, portio dura, auditory, glossopharyngeal, and pneumogastric nerves; *v.c*, one of the lateral ventricles of the *lobus communis*, laid open from below.

The brain is represented from above in fig. 1, from the left side in fig. 2, and from below in fig. 3.

The brain of *Ceratodus* nearly fills the cranial cavity, the interspace left between it and the walls of the latter being, to a great extent, occupied by a peculiar reticulated tissue. The *medulla oblongata* is long and slender, but widens, anteriorly, in the region of the fourth ventricle. This cavity is arched over by a *tela vasculosa* (*Tv*, figs. 1 and 2), separated into two lateral convexities by a slight median depression. In front, each convexity is continued into a blind rounded cornu, which lies over the origin of the fifth and seventh auditory nerves. The two cornua diverge, and the cerebellum is continued backwards as a triangular lamella between them. The cerebellum is relatively very small, being represented merely by the thin arched roof of the anterior part of the fourth ventricle. In front of it is a rounded elevation, obscurely divided by a longitudinal depression into two. These are the only indications of the optic lobes of the mid brain, or mesencephalon. In front of this is the fore brain. The hinder division (or thalamencephalon) is narrower than the mesencephalon, and passes below into the infundibulum, which terminates in the large, oval, flattened, pituitary body (*hypophysis*). This is lodged in an excavation of the cartilaginous floor of the skull representing the *sella turcica.*

Dorsally, the thalamencephalon is continued upwards and forwards into the subcylindrical peduncle of the pineal gland (*epiphysis* or *conarium*). This is a large heart-shaped body, the base of which is turned downwards and backwards. The apex is connected by fibrous and vascular tissue with a depression in the cartilaginous roof of the skull.

Next follows the largest division of the brain, answering to the cerebral hemispheres and the olfactory lobes. The former are represented by a single oval *lobus communis,* the middle area of the roof of which is occupied by a broad thick *tela vasculosa.* From the anterior dorsal aspect of the prosencephalon proceeds, on each side, the large olfactory lobe, which, flattening in front, and becoming obliquely truncated, terminates against the posterior walls of the olfactory sacs. A backward prolongation of the mesethmoid cartilage separates the two lobes. In the lateral view of the brain (fig. 2) the manner in which the olfactory lobes take their origin from the dorsal aspect of the prosencephalon is well seen. The short and thick infundibulum, terminating in the flattened oval pituitary body, and the origins of the second, third, fifth, eighth, ninth, and tenth nerves are shown.

The ventral view (fig. 3) displays the origins of the small optic nerves (II) which arise close together from the floor of the thalamencephalon. Whether any *chiasma* exists could not be ascertained.

In the middle line of its ventral aspect the prosencephalon presents a deep longitudinal fissure, lodging anterior cerebral arteries. The walls of the fissure have been separated by turning the left division of the prosencephalon to one side; and the floor of the ventricle (*v.c*), which is contained in the prosencephalon, has been removed.

When the dorsal wall of the brain was cautiously laid open by a median section, it was found to contain one large ventricular cavity the separation of which into fourth and third ventricles was indicated only by slight constrictions of the roof and side walls. The large ventricle of the prosencephalon is partially separated into two chambers by a median septum, formed by the infolding of its ventral wall; and the spacious ventricle of each olfactory lobe opens into the dorso-lateral part of each of these chambers.

The place and mode of origin of the olfactory and of the optic nerves have already been mentioned.

The third nerve is indicated in the figure; but I am somewhat doubtful as to the nature of the cord thus marked.

No fourth or sixth nerve was observed.

The fifth arises by a single large cylindrical root just below the anterior end of the cornu of the tela vasculosa of the fourth ventricle. The seventh and eighth leave the medulla by a common root just behind this; and the roots of the ninth and tenth nerves, divided into three bundles, arise from a tract at the sides of the medulla which extends from the last to the hinder limit of the *tela vasculosa*, and incline obliquely backwards to their exit.

The brain of *Ceratodus* is very singular and interesting, inasmuch as it presents resemblances to that of the Marsipobranchii on one side, to that of the Ganoids and Amphibia on another, and to that of the Chimæroids and Plagiostomi on a third.

As in the brain of the Marsipobranchii, the pineal gland is relatively very large, with its pointed dorsal end inclined upwards and forwards, and the roof of the fourth ventricle is almost entirely formed by the *tela vasculosa*; but, as in the Ganoidei and Amphibia, the cerebellum is larger than in the Lampreys. In *Ceratodus* it is similar to, though proportionally less than, that of *Lepidosteus*, and still more like that of *Polypterus*. In the proportions of the thalamencephalon the brain of *Ceratodus* resembles that of the Sturgeon and that of the Ray; while in the representation of the cerebral hemispheres, or prosencephalon, by a large imperfectly divided *lobus communis*, from the dorso-lateral regions of which the olfactory lobes take their rise, the brain of *Ceratodus* presents a feature hitherto known, so far as I am aware, only in the Plagiostomi*. Thus, in its cerebral characters, *Ceratodus* occupies a central place in the class Pisces.

The development of the cerebral hemispheres in Plagiostome fishes differs from the process by which they arise in the higher Vertebrata. In a very early stage, when the first and second visceral clefts of the embryo of *Scyllium* are provided with only a few short branchial filaments, the anterior cerebral vesicle is already distinctly divided into the thalamencephalon (from which the large infundibulum proceeds below, and the small tubular peduncle of the pineal gland above, while the optic nerves leave its sides) and a large single oval "vesicle of the hemispheres." On the ventral face of the integument covering these are two oval depressions, the rudimentary olfactory sacs.

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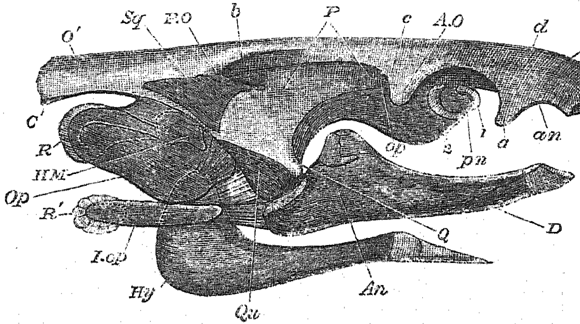
* So far as I can judge from the examination of a small but well-preserved specimen of *Lepidosiren annectens*, for which I am indebted to Mr. Sclater, the brain of this fish is similar, in all essential respects, to that of *Ceratodus*. The figure of the brain of *Lepidosiren* given by Prof. Owen in his 'Anatomy of Vertebrates' is susceptible of interpretation in this sense. Hyrtl's description and figure of the brain of *Lepidosiren paradoxa* (Abhandlungen der königlichen böhmischen Gesellschaft, Bd. iii. 1845), on the other hand, leave me in doubt whether, apart from its curious asymmetry, the brain of this fish does or does not present important differences from that of *Ceratodus* and that of *Lepidosiren annectens*.

As development proceeds, the vesicle of the hemispheres becomes divided by the ingrowth of a median longitudinal septum, and the olfactory lobes grow out from the posterior lateral regions of each "ventricle" thus formed, and eventually rise onto the dorsal faces of the hemispheres, instead of, as in most Vertebrata, remaining on their ventral sides. I may remark that I cannot accept the views of Miklucho-Maclay, whose proposal to alter the nomenclature of the parts of the Elasmobranch's brain appears to me to be based upon a misinterpretation of the facts of development.

II. *The Skull.*

Dr. Günther* distinguishes in the skull an "inner cartilaginous capsule and an outer incomplete osseous case, to which again some outer cartilaginous elements are appended. In the former the confluence of cartilage is so complete, that no distinct divisions are traceable by sutures; its parts can be designated only by reference to the locally corresponding bones of the teleosteous skull."

Fig. 4.



Ceratodus forsteri. Lateral view of the chondrocranium, with most of the bones and fibrous tissues removed.

ol, position of the olfactory sac; *an*, *pn*, position of the anterior and posterior nares; *a*, process of the cranial cartilage, *d*, between the two; 1, 2, upper labial cartilages; *op*, optic foramen; *A.O*, antorbital process; *P.O*, postorbital process; *P.Q*, palato-quadrate process; *Sq*, *Qu*, remains of the bony plate which lies on the outer side of this process; *O.C*, occipital prolongation of the chondrocranium roofing over the branchial cavity; *D*, dentary; *An*, angular; *Hy*, hyoid; *I.op*, interoperculum; *Op*, operculum; *R*, *R'*, cartilages representing hyoidean rays; *HM*, hyo-mandibular.

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* *L. c.* p. 521.

This would seem to imply that the chondrocranium of vertebrated animals is formed by the coalescence of parts analogous to those which compose the bony skull of osseous fishes. As a matter of fact, however, the chondrocranium is never formed of such elements, but is built up, at a very early stage of embryonic development, by the union of primitively distinct parachordal, otic, and pleural elements*, which in no way correspond with the bones of the teleostean skull. And when Dr. Günther subsequently (*l. c.* p. 522) speaks of "three groups of superficial labial cartilages," "the upper labial," the "supraorbital," and the "lower labial," the discrimination of such cartilages must, I think, be regarded merely as regional anatomy; and it must not be supposed that they have any thing to do with the cartilages to which the same names are applied in other fishes, several of which exist in *Ceratodus*, and will presently be described.

When the osseous and merely fibrous structures are carefully removed, I find that the chondrocranium (figs. 4, 2, and 7) consists of a continuous cartilaginous mass, the interorbital region of which is much narrower than any other part, produced inferiorly and laterally into two stout suspensorial or palato-quadrate processes, with the pulley-shaped ventral ends of which the strong Meckelian cartilages are articulated. Anteriorly the orbits are bounded by the *antorbital processes* (*A.O*), which curve downwards in front of the eye. From these antorbital processes the cartilage is continued forwards to form the evenly curved roof of the ethmoidal region and its contained nasal chambers, and, bending down on all sides, ends in a free edge, which is slightly concave opposite each anterior nasal opening (*an*, fig. 4), and much more deeply excavated opposite the posterior nares (*pn*, fig. 4). The small process (*a*) which lies between the two excavations in question is connected by a strong fibrous band with the antorbital process (*A.O*), and this, by the ossified bar described by Dr. Günther, with the *postorbital process* (*P.O*); but these structures have nothing to do with the chondrocranium. Behind the orbits, the skull suddenly widens out into two broad periotic masses, which lodge the auditory labyrinth. Anteriorly and ventrally these processes are continued into the suspensorial pillars (*Qu*); while behind they pass into thin but wide cartilaginous plates (*O, C*, fig. 4), which roof over the chambers in which the branchiæ are lodged.

I thought at first that *Ceratodus* had no labial cartilages; but at length I discovered two small upper labial cartilages in their right places, namely in the region of the nostrils.

One of them (1, figs. 4 and 5) lies in the roof of the mouth, just in front, and on the inner side of, the posterior nasal aperture. It is fixed to the mesethmoidal cartilage (*M.E*) by fibrous bands, and is broader behind than in front. The inner edge of this cartilage is concave, the outer convex, and it has a nearly horizontal direction.

The second cartilage (2, figs. 4, 5, 7) is stouter, and lies behind, and on the outer side of, the posterior nasal aperture. Its dorsal end is attached to the base of the skull and anterior part of the palato-quadrate cartilage just above the middle of the palatine tooth. It thence descends with an outward convexity and inward concavity, and terminates in the upper lip near the angle of the mouth.

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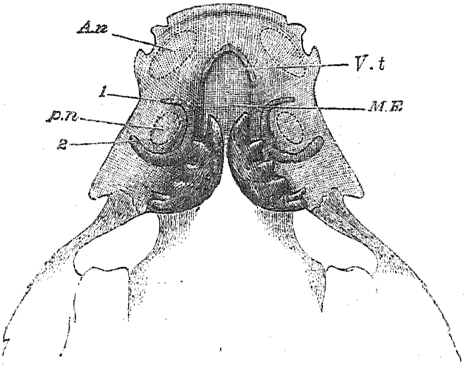
* "On the Structure of the Skull &c. of *Menobranchus lateralis*," P. Z. S. 1874.

Dr. Günther states (*l. c.* p. 524) that "the body of the mandible is persistent cartilage; but its entire outer and inner surfaces are covered by bone, forming an articular and a dentary piece. . . . . . The articular and dentary bones meet near the top of a low but strong coronoid process, and again at the symphysis, which is formed by fibrous tissue, and may easily be separated by the knife . . . . In front of the jaw the cartilage is expanded into a slightly concave lamella (lower labial cartilage)."

Fig. 5.



Ceratodus forsteri. Underview of the skull, showing the vomerine teeth (*V.t*), the palatine teeth, the mesethmoid cartilage (*M.E*), and the upper labial cartilages (1, 2) in place. The dotted lines *An*, *p.n* indicate the form and position of the anterior and the posterior nares.

I find a persistent Meckelian cartilage, such as that here described; but as, after careful removal of the ensheathing bones, I have been unable to discover any separation between this lamellar expansion and the rest of the cartilage, I am in doubt whether the lamella represents the lower labial cartilage or not. The analogy of the Frog, however, leads one to suspect that distinct lower labial cartilages may exist in the young *Ceratodus*.

Dr. Günther does not mention a third ensheathing bone (figs. 2 and 4, *D*) which is united by suture with the other two, and lies on each side of the symphysis on the ventral face of the mandible. It is a flat plate, of a triangular form, with a thick rugose inner edge for the attachment of the symphysial ligament. Its posterior edge is thin and concave; its external edge is also thin and overlaps the bone termed "articular" by Dr. Günther, uniting with it by a squamous suture. The outer half of its dorsal aspect is smooth, and helps to support the ventral face of Meckel's cartilage; the inner or symphysial half presents a broad rough triangular surface, which extends on the inner side of the symphysial end of Meckel's cartilage, and unites with a corresponding surface furnished by the expanded symphysial end of the bone, termed "dentary" by Dr. Günther. I cannot doubt that this bone is the representative of the true "dentary" element; nor is there any question in my mind that Dr. Günther's "dentary" is the true "splenial" element, while his articular answers to the "angular" piece of the vertebrate mandible. In the attachment of the tooth to the splenial, and not to the dentary, element, *Ceratodus* presents an interesting and important feature of resemblance to *Siren* and to larval Salamanders on the one hand, and, on the other, to *Polypterus*.

The splenial element in this Ganoid resembles that of *Ceratodus*, not only in bearing teeth, but in form, position, and relative size. In a young specimen of *Polypterus* I find that the splenial does not extend continuously to the symphysis, but that, between its anterior termination and the latter, there are two short and broad bony plates developed in the fibrous tissue which overlies Meckel's cartilage; these bear teeth, and correspond with the expanded symphysial end of the splenial in *Ceratodus*. *Polypterus* has a true *articulare*, from which Meckel's cartilage is continued. The *angulare* is much shorter, and the *dentale* much longer than in *Ceratodus*.

The hyoidean and opercular apparatus present characters of singular interest. Dr. Günther says that "on the hinder side of the tympanic pedicle*, near its base, there is a small round tubercle, for the suspension and articulation of the hyoid arch (pl. xxxiv. fig. 3, *v*)."

I presume that this "small round tubercle" of the suspensorial expansion of the cranium is the small cartilage marked *H.M* in figs. 4 and 6. But this is neither a process of the suspensorium, nor does it articulate with, nor take the principal share in, suspending *Hy*, which is Dr. Günther's "hyoid arch."

In fact it is, as fig. 6 shows, a distinct, though small, four-sided, flattened cartilage, the anterior and ventral angle of which is produced into a short conical process (*Sy*). Its anterior edge is firmly united with the skull, just where the cranium proper passes into the suspensorium. At this point there is a triangular vacuity filled with fibrous tissue, through which the posterior division of the seventh nerve passes (figs. 1 and 6, VII). The outer face of the cartilage is loosely connected with the operculum (*Op*); and the conical process (*Sy*) is imbedded in the dorsal and posterior part of the powerful ligament (*h.s*) (corresponding with the hyosuspensorial ligament in *Menobranchus*†) by which *Hy* is mainly kept in place.

It is obvious that this little cartilage is the homologue of the hyomandibular element of the hyoidean arch of other fishes, the small conical process being the rudimentary *symplectic*, and, therefore, that it is itself the dorsal element of the hyoidean arch, attached in its normal position, as its relations to the seventh nerve show. The hyoidean cornua are very strong, and consist of a cartilaginous axis almost completely ensheathed by bone. The dorsal end of each is attached by the strong hyo-suspensorial ligament aforesaid to the suspensorium; but another very strong round ligament (answering to the *mandibulo-hyoid ligament* of *Menobranchus**) connects the dorsal end of the hyoidean cornu with the angle of the mandible (figs. 4 and 6).

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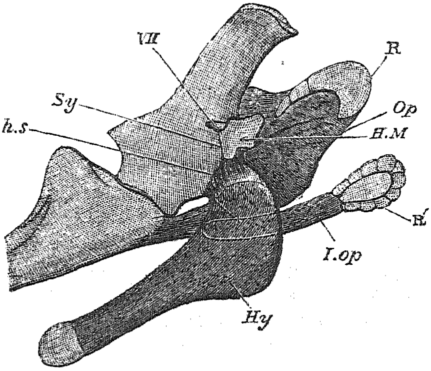
* It is surely to be regretted that any writer of authority should retain the misleading name of "tympanic pedicle" for a part the total distinctness of which from the "tympanic bone" of the higher Vertebrata has now been so copiously demonstrated.

† P. Z. S. 1874, pl. xxix. figs. 1 and 2.

Fig. 6.



Ceratodus forsteri. Inner view of the right hyoidean arch (*Hy*), with the opercular apparatus and part of the suspensorium and of the mandible.

H.M, hyomandibular cartilage; *Sy*, its symplectic process; *Op*, operculum; *I.op*, interoperculum; *R*, *R'*, cartilaginous rays attached to the inner face of the operculum and interoperculum; VII, exit of the posterior division of the seventh nerve; *h.s*, hyosuspensorial ligament (immediately beneath it is the mandibulo-hyoid ligament).

Thus the hyoidean arch of *Ceratodus* strikingly resembles that of a Plagiostome on the one hand, and that of an Amphibian on the other. And the small hyomandibular presents a form and connexions which are strikingly similar to those of the *suprastapedial* cartilage in the Sauropsida†, which, on a former occasion, I showed to be the summit of the hyoidean arch and the homologue of the mammalian incus.

In describing the operculum Dr. Günther says (*l. c.* p. 525), "A small movable piece of cartilage is found inside of the articulary groove of the opercle (pl. xxxiv. figs. 2 and 3, *k*): it is a rudiment of the præoperculum."

Neither the figures referred to nor the account given enable me to be certain that they apply to the cartilaginous structures I am about to describe, and which are to be found not only on the inner face of the operculum, but on that of the interoperculum*.

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* P. Z. S. 1874, *ibid.*

† "On the representatives of the Malleus and Incus of the Mammalia in other Vertebrata," P. Z. S. 1869.

On the inner side of the former and projecting beyond its free edge is a curved band of cartilage divided into several portions†. One of these, that nearest the hyomandibular, is conical and bent at an angle to that which follows it. The terminal plate is broad and crescentic, and, on one side, was subdivided towards its free edge. On the inner face of the posterior end of the interoperculum (*I.op.*) there is an oval cartilage surrounded by eight or nine smaller nodules.

These cartilages represent the cartilaginous branchiostegal rays of Plagiostomes, which are often subdivided into two groups—a dorsal group attached to the hyomandibular, and a ventral group to the cornual division of the hyoid arch.

The *præoperculum* of Fishes and the *squamosal* of the higher Vertebrata are represented by the bone *Sq*, termed "tympanic lamina" by Dr. Günther. I have marked the lower piece, which was distinct on the specimen represented in fig. 4, *Qu*; but in another specimen I can find no subdivision, and I am disposed to think that the division arose from an accidental dismemberment of a squamosal (or præoperculum) corresponding with that of *Menobranchus* (P. Z. S. 1874, pl. xxix. fig. 1, *Sq*), and that there is no true quadrate in *Ceratodus*. I can discover no ossification of the substance of the articular extremity of the suspensorium, such as occurs in the Amphibia. The pterygopalatines and the vomers, which last are represented only by the bases of the two vomerine teeth, are similar in their form and relations to the corresponding bones of Urodele Amphibia.

With respect to the branchial apparatus, Dr. Günther (*l. c.* p. 526) says that it "does not differ from that of Teleostean fish, but is entirely cartilaginous. There are five branchial arches, the last rudimentary and attached to the base of the fourth. There is no peculiar modification of any part of this apparatus; and the middle pieces have the usual groove for the reception of the vessels and nerves."

I find that each of the anterior four branchial arches consists of a long ventral and a short dorsal piece of cartilage: the former pieces are united by ligament at their ventral ends, the third and fourth curving forwards in this part; they are connected by joints surrounded by ligaments with the dorsal pieces (fig. 2). In the median ventral line, between the ends of the ventral pieces, lie two cartilages—an anterior elongated and spindle-shaped ($M.B^1$), which is connected by a strong ligament with the median piece of the hyoid arch, and a posterior rounded nodule ($M.B^2$) at some distance from the foregoing. The fifth arch consists of a single piece of cartilage curved forwards and united with the principal branchial of the fourth arch, both above and below; in front of it, close to the ventral end of the fifth arch, was a small nodule of cartilage, which is probably a rudimentary sixth arch (6).

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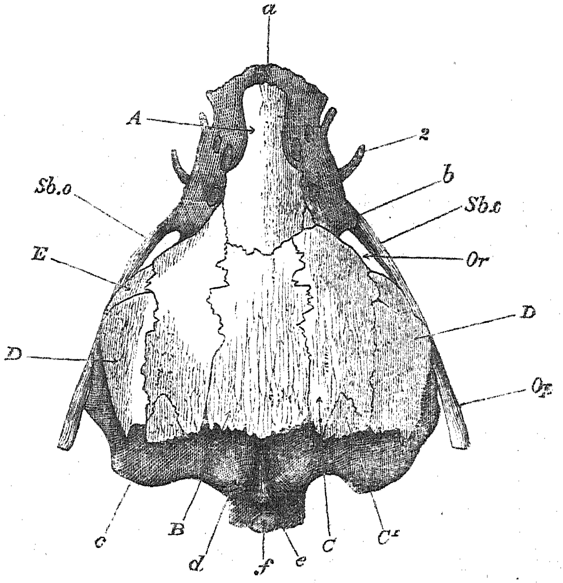
* Dr. Günther terms the bone here named interoperculum, "suboperculum." He says (*l. c.* p. 525) that to the lower edge of the operculum "is attached by fibrous tissue the long styliform *suboperculum*, terminating at a considerable distance from the mandibulary joint." It is quite true that the bone in question is thus attached to the operculum; but a much more important connexion takes place between its ventral end and the angle of the jaw, by means of strong ligamentous fibres which run into the hyomandibular ligament. It thus more closely resembles the interoperculum of Teleosteans than it does the suboperculum.

† In a specimen of the skull of *Ceratodus*, for which I am indebted to my friend Mr. F. M. Balfour, the curved band of cartilage of the operculum is not subdivided, and the interopercular cartilages are divided less regularly and differently on the two sides.

Fig. 7.



Ceratodus forsteri. Dorsal aspect of the skull.

a, the anterior end of the chondrocranium; *b*, the antorbital process of the chondrocranium; *c*, its suprabranchial expansion; *d*, lateral elevations of the occiput; and *e*, median ridge, with the surface for the attachment of the anterior fin-ray; *f*, articular surface for the second fin-ray; *A*, anterior median bone; *B*, posterior median bone; *C*, inner lateral bone; *C'*, distinct ossification on the posterior extremity of this bone; *D*, outer lateral bone (squamosal); *E*, a separate ossification on the left side; *Op*, operculum; *Or*, orbit; *Sb.o*, suborbital bones; 2, the posterior upper labial cartilage.

As Dr. Günther has pointed out, the osseous shield which covers the dorsal aspect of the skull consists of two median bones (fig. 7, *A*, *B*), one anterior and one posterior, which he terms "ethmoid" and "scleroparietal," and of two pairs of lateral bones, the "frontals" internally (fig. 7, *C*) and the "tympanic laminæ" externally (fig. 7, *D*). In my specimens the anterior half of the anterior median bone (*A*) has a different shape from that given in Dr. Günther's plate xxxiv. fig. 1, and its margins are very well defined. Moreover, in one specimen, the hinder end of each inner lateral bone is completed by a distinct ossification (C'). There is also a separate ossification (E) on the left side, on what corresponds with the front part of the outer lateral bone on the right side. Doubtless these bones are subject to much individual variation.

The fibrous band which extends, below the eye, between the antorbital process and the ventral end of the suspensorium contains three suborbital bones. The anterior of these, trihedral, is connected by its broad base with the antorbital process; the middle bone is slender and elongated; the posterior is broad, flattened from side to side, and its hinder edge is fixed by ligamentous fibres to the outer face of the suspensorium and of the squamosal.

The *basal bone* of Dr. Günther is the parasphenoid. It extends backwards, beyond the limits of the proper cranium, into the region of the vertebral column, to a point just beyond the attachment of the third pair of ribs. But there is at least one vertebra in front of that which bears the first pair of ribs. In *Ceratodus*, as in the Sturgeon and other Ganoids, several anterior vertebræ have coalesced with one another and with the skull; or, probably, it would be more accurate to say that the investing mass of the notochord has not become differentiated into vertebræ for this extent. Nevertheless the posterior boundary of the skull can be strictly defined by the interspace between the exit of the pneumogastric and that of the next following, or first spinal, nerve.

It is to the outer surface of this interspace that the anterior edge of the "suprascapular" element of the pectoral arch is fixed by strong ligamentous fibres (fig. 2). Just in front of the boundary between the skull and the vertebral column, and therefore in the side walls of the former, there lies, deep in the substance of the cartilage, a hollow cone of bone ($E.O$) It is wider above and externally than below and internally, where its end lies above the notochord. This appears to be an exoccipital ossification, such as is to be found in greater state of development in *Lepidosiren*, *Polypterus*, and *Menobranchus*.

The skull of *Ceratodus* is, as might be expected (and as Dr. Günther has pointed out), extremely similar to that of *Lepidosiren*. In fact, beyond differences in the proportions of its various parts, the more extensive fenestration of the roof of the olfactory capsules in *Lepidosiren*, and the absence, so far as my investigations have yet gone, of the hyomandibular cartilage in the latter genus, the cartilaginous elements of the skull are the same in the two cases.

As to the superadded bones, the parasphenoid, the rudimentary vomers, and the pterygopalatine plates correspond in the two genera. The exoccipitals are much larger in *Lepidosiren*. The descending process or præopercular part of the squamosal is best developed in *Lepidosiren*, whilst its dorsal part (proper squamosal) is larger in *Ceratodus*.

In both, there are two opercular bones, an operculum and an interoperculum; and in *Lepidosiren*, as in *Ceratodus*, there are cartilaginous plates attached to the inner faces of these bones.

The branchial apparatus of *Lepidosiren* differs from that of *Ceratodus* mainly in the greater number of complete branchial arches.

It can hardly be doubted that the bone *D* of *Ceratodus* is represented, though incompletely, by the supraorbital of *Lepidosiren*, while the bony nasal shield of the latter corresponds very closely with the anterior median bone (*A*) of *Ceratodus*. The posterior boundary of the bone, however, lies further back in *Ceratodus* than it does in *Lepidosiren*. The argument of Dr. Günther that the posterior median bone (*B*) in *Ceratodus* is not the homologue of the parieto-frontal of *Lepidosiren*, because it lies above the muscles, while the latter is situated beneath them, is weighty against the identification of the bones in question; and, in other respects, the parieto-frontal of *Lepidosiren* is very unlike the "scleroparietal" of *Ceratodus*.

When the comparison of the cranial and facial bones of *Ceratodus* with those of the Vertebrata is extended beyond the limits of the Dipnoi, the determination of their homologues is beset with many difficulties. *Polypterus* has an anterior and a posterior median shield in the roof of the skull, which at first seem to correspond with those of *Ceratodus*; these shields are each formed by the union of two bones, which are evidently comparable to the frontals and parietals of the higher Vertebrata, while the frontals unite with a pair of broad nasals which cover the olfactory sacs. The apices of the posterior triangular edges of these bones reach back to near the level of the middle of the orbits; and the frontal bones are continued forwards on each side of them. Between the two nasal bones there is a median ossification which lies upon the mesethmoidal cartilage and spreads out in front, ending by a broad edge which articulates with the præmaxillæ.

The median bone, the piscine "ethmoid," occupies the same position as the anterior median bone of *Ceratodus* would do if the ethmoidal region were reduced to the proportions it has in *Polypterus*. Therefore, from this point of view, the determination of the bone as "ethmoid" by Dr. Günther seems fully justifiable; and the inner lateral and the median posterior bones would seem to represent the frontal and parietal bones of *Polypterus*.

On the other hand, the many points of resemblance between *Ceratodus* and the Amphibia suggest the comparison of the anterior and posterior median bone to the frontals of *Menobranchus*, and of the inner lateral bones to the parietals of this Amphibian. The forward extensions of the latter, at the sides of the frontals, are especially noticeable in comparison with the anterior extremities of the inner lateral bones of *Ceratodus*. On the whole, I am inclined to think that *Polypterus* is the better guide in the interpretation of the cranial bones of *Ceratodus*, though the difference between the bones of *Ceratodus* and those of the Crossopterygian ganoids, all of which are readily reducible to the Polypterine type, is very considerable.

In other respects the skull of *Cerotodus* finds its closest parallel among the Amphibia, especially such Urodela as *Menobranchus**, and the Anura in their tadpole state.

* See P. Z. S. March 17, 1874.

I have already indicated the chief points of resemblance to the amphibian skull, and need not recapitulate them here. The most important feature is the manner in which the mandibular arch is connected with the skull.

The part of the palato-quadrate cartilage which is united with the skull, between the exits of the fifth and second nerves, answers to the "pedicle of the suspensorium" of the amphibian, while its backward and upward continuation onto the periotic cartilage corresponds with the otic process. As in the Amphibia and in the higher Vertebrata, the mandibular arch is thus attached directly to the skull by that part of its own substance which constitutes the suspensorium. It may thus be said to be *autostylic*.

Among fishes, the only groups which possess an autostylic skull, or in which the dorsal end of the mandibular arch is continuous with the cartilage of the brain-case, are the Chimæroids and the Marsipobranchii.

In *Chimæra*, the general form and connexions of the palato-quadrate cartilage are the same as in *Ceratodus*; but it differs from that of *Ceratodus* as that of the tadpole differs from that of a young Frog, or as that of *Menobranchus* differs from that of *Menopoma*; that is to say, the articular condyle is situated far more forward, and the gape is, in consequence, relatively shorter in the former than in the latter. There are the same large olfactory capsules in both cases. In *Chimæra*, however, these project beyond the termination of the ethmoidal cartilage, while in *Ceratodus* the latter projects beyond the olfactory capsules, which are more lateral in position, more elongated, and, in accordance with the general form of the head, much more depressed.

Just as in *Ceratodus*, the palato-quadrate cartilage of *Chimæra* bears two teeth marked with radiating ridges, while two others, the vomerine teeth, are supported by the ethmoidal cartilage in front of these; and in both cases there is a tooth with radiating ridges on its surface in each ramus of the mandible.

In the disappearance of the notochord and the articulation of the skull with the anterior coalesced vertebræ, the skull of *Chimæra* presents a higher degree of differentiation than that of *Ceratodus*; while it is needless to speak of such aberrant peculiarities as its supracerebral interorbital septum, or the vast crest into which the skull is raised above the anterior part of the brain-cavity. In other respects, however, as in the inclination of the axis of the suspensorium already noted, the skull of *Chimæra* presents lower characters than that of *Ceratodus*. Among these may be reckoned the great size of the upper and lower labial cartilages and the condition of the hyoidean arch, which, except in size and some peculiarities of form, is altogether similar to the four branchial arches which follow it. Like them, it terminates, dorsally, in a flat, expanded, triangular piece, which is connected with the superjacent floor of the skull by muscles and ligaments, but by no direct articulation. The dorsal pieces of the succeeding branchial arches have the same form and attachments, and unite with the ventral segments at a sharp angle. These angles are all connected together by a strong ligament, which is continued to the pectoral arch. Moreover a small styliform cartilage passes from the last angle to the pectoral arch, and is connected with the dorsal end of the fifth branchial arch. It appears to represent the dorsal element of that arch.

Johannes Müller, fully appreciating the importance of the differences between the skull of the Chimæroids and those of other "Elasmobranchii," and sagaciously remarking that "the skull of *Chimæra* is most like that of a tadpole"*, was thereby led to separate the Chimæroids as a suborder of the Elasmobranchii under the name of *Holocephali*. It appears to me that he might have been justified in going still further; for, considering, in addition to the cranial characters, the structure of the vertebral column and of the branchiæ, the presence of an opercular covering to the gills, the peculiar dentition, the almost undeveloped gastric division of the alimentary canal, the opening of the rectum quite separately from and in front of the urinogenital apertures, the relatively small and simple heart, the Chimæroids are far more definitely marked off from the Plagiostomes than the Teleostei are from the Ganoidei.

In all other Fishes, except the Marsipobranchii, the mode of connexion of the mandibular arch with the skull is different from that which obtains in the Chimæroids and the Dipnoi. The palato-quadrate cartilage is no longer continuous with the chondrocranium (though the bony elements of that arch may unite suturally with those of the skull, as in the Plectognathi), but is, at most, united with it by ligament. Moreover the dorsal element of the hyoidean arch, or the hyomandibular, usually attains a large size and becomes the chief apparatus of suspension of the hinder end of the palato-quadrate cartilage with the skull. Skulls formed upon this type, which is exemplified in perfection in Ganoidei, Teleostei, and ordinary Plagiostomes, may therefore be termed *hyostylic*.

But though the typical forms of autostylic and hyostylic skulls, as exemplified, *e.g.*, by a Sturgeon, a Pike, and a Dogfish or Ray, on the one hand, and *Chimæra*, *Ceratodus*, and *Menobranchus* on the other, are thus widely different, certain Plagiostomes present a condition of the cranium which tends to connect the two by a middle form, which may be termed *amphistylic*.

In the amphistylic skull the palato-quadrate cartilage is quite distinct from the rest of the skull; but it is wholly, or almost wholly, suspended by its own ligaments, the hyomandibular being small and contributing little to its support. The embryo amphibian is amphistylic before it becomes autostylic; and, in view of certain palæontological facts, it is very interesting that the link which connects the amphistylic with the ordinary Selachian skull is that of *Cestracion* (fig. 8).

If the palato-quadrate cartilage of *Chimæra* were membranous in the centre, as it is in the tadpole, and if along three lines radiating from this centre the cartilage were converted partly into fibrous tissue and partly into a true joint, the result would be to produce a palato-quadrate apparatus such as that exhibited by *Cestracion*. The huge palato-quadrate cartilage (*Pl*, *Qu*) of *Cestracion* is united with the skull in the præorbital region by a joint, and in the orbital region by fibrous tissue, and answers to that part of the palato-quadrate cartilage of *Chimæra* which lies between the nasal capsule and the mandible.

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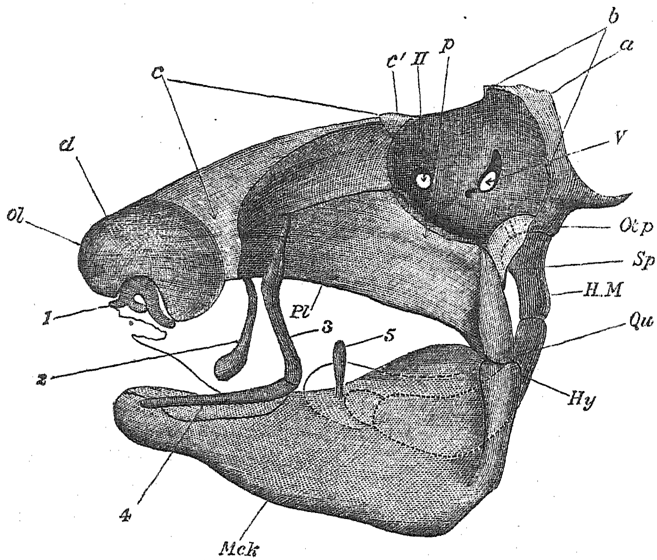
* 'Vergleichende Anatomie der Myxinoiden,' erster Theil, p. 150.

Fig. 8.



Cestracion philippi. Left lateral view of the skull.

a, occiput; *b*, postorbital process; *c*, *c′*, antorbital process; *d*, anterior end of the chondrocranium; *ol*, olfactory capsule; *Ot.p*, otic process, or spiracular cartilage; *Sp*, place of the spiracle; *H.M*, hyomandibular cartilage; *Qu*, articulation of the palato-quadrate cartilage (*Pl*, *Qu*) with the lower jaw (*Mck*); *p*, part of the palato-quadrate arch which answers to the pedicle of the suspensorium in Amphibia; *Hy*, hyoid; II, foramen for the optic, and V, for the trigeminal nerves; 1, 2, 3, 4, the upper and lower labial cartilages; 5, a small cartilaginous style attached by ligament to the mandibular cartilage.

The small cartilaginous plate (*Ot.p*), which is connected only by ligament with the periotic cartilage above and with the quadrate below, answers to the *otic process* of the Frog's suspensorium. This cartilage lies in the front wall of the spiracle, which in *Cestracion* is situated low at the sides of the head, nearly in a line with the branchial clefts, or in the position which it occupies in fœtal Selachians. Moreover this so-called *spiracular cartilage* bears a rudimentary gill and is so far comparable to any of the branchial arches*.

In possessing this permanent mandibulo-hyoid cleft, or spiracle, which is the homologue of the tympanic cavity and Eustachian tube of the higher Vertebrata, and in the permanence of its rudimentary branchia, *Cestracion* exhibits a lower stage of organization than *Chimæra*, in which, as in *Ceratodus*, the mandibulo-hyoid cleft has disappeared. On the other hand, the hyoidean arch presents a form intermediate between that of the ordinary Selachians and that of *Ceratodus* and *Chimæra*. It is stout; and its dorsal element, still retaining a little of its original form, but much thicker and more cylindrical, is no longer united with the skull by ligament and muscle merely, but articulates with a process of the underside of the periotic capsule. Moreover its distal end is connected by strong ligamentous fibres with the posterior end of the palato-quadrate cartilage and with an inward process of the articular end of the mandible (the *sustentaculum* of Gegenbaur).

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* Gegenbaur considers the spiracular cartilage to be a ray of the mandibular arch.

In fact, the "epibranchial" of the hyoidean arch of *Cestracion* is just beginning to take on a new function, that of suspending the palato-quadrate cartilage and mandible to the skull. It is a true hyomandibular, though small and insignificant relatively to what it becomes in other Plagiostomes, in Ganoids, and in Teleostei.

Had I been acquainted with the skull of *Cestracion* in 1858, I should have been spared the hesitation which I then felt* as to identifying the hyomandibular of Fishes with the summit of the hyoidean arch, and which has subsequently been removed by abundant evidence published by Mr. Parker and myself.

In the general form of the skull, the position and proportions of the olfactory capsules, and the characters of the principal labial and alinasal cartilages, *Cestracion* has a stronger resemblance to *Chimæra* than is exhibited by any other Plagiostomes; and I take it to be one of the lowest of Selachian skulls.

I am aware that in expressing this opinion I am diametrically opposed to Gegenbaur†, whose elaborate study of the Plagiostome skull entitles his opinion to the greatest weight, and who regards *Cestracion* as possessed of one of the highest of skulls in its group, while *Heptanchus* and *Hexanchus* have the lowest.

There is a certain ambiguity about the terms "highest" and "lowest;" but if by the former we understand the most extreme modification of the hyostylic type of skull characteristic of the group, then I should have no hesitation in regarding the skulls of the Rays as the highest of Plagiostome skulls, while *Cestracion* represents a low form of the autostylic type.

Notidanus, on the other hand, appears to me to have an essentially low form of skull, so far as it is more completely amphistylic than any ordinary Plagiostome; but on this low form is superinduced a modification by which it approaches the higher autostylic skull. This is the union of the palato-quadrate arch with the postorbital process of the skull—an articulation which, in Prof. Gegenbaur's view, represents the primitive attachment of the mandibular arch, but, in my apprehension, is an altogether secondary connexion.

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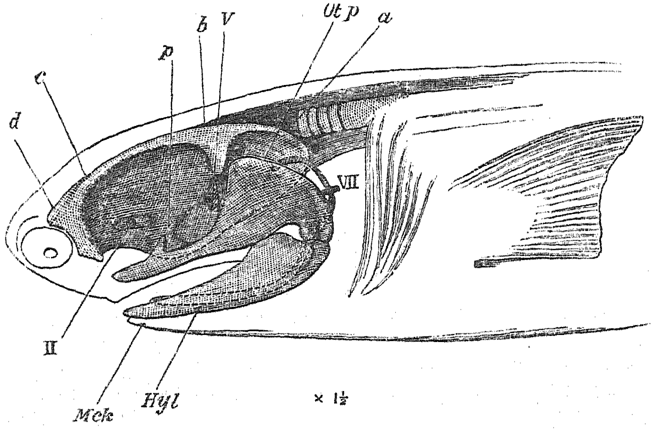
* Croonian Lecture, 1858, and Lectures on the Theory of the Skull, 1864. See also "On the Malleus and Incus," P. Z. S. 1869; 'Manual of Vertebrate Anatomy,' 1871, p. 85; and Mr. Parker's "Memoir on the Development of the Salmon," Phil. Trans. 1872.

† 'Das Kopfskelet der Selachier,' p. 60. In controverting the opinion of Professor Owen that the *Cestracion* is less advanced in cranial development than *Squatina*, Gegenbaur observes, "So möchte ich gerade das Gegentheil behaupten, und nicht etwan bloss bezüglich der Basalverhältnisse des Craniums."

I am indebted to Dr. Günther for a fœtus of *Notidanus* (*Heptanchus*) *cinereus* in excellent condition; and the examination of the skull (fig. 9), which presents all the characteristic features of the adult*, has confirmed the suspicion which I previously entertained, that the skull of *Notidanus*, though fundamentally of a low type, is greatly modified so far as the jaws are concerned. What first led me to suspect that this might be the case was the backward position of the articular end of the suspensorium and the relative length of the gape—features in which the skull of *Notidanus* differs from that of ordinary Selachians as an old frog differs from a young one.

Fig. 9.



Notidanus cinereus. Left lateral view of the skull.
Letters as in the preceding figures. VII, the posterior division of the portio dura.

The palato-quadrate cartilage of *Notidanus* has an inward process (*p*), which lies in a strong ligamentous band, by which it is attached to the skull between the optic and trigeminal foramina. This answers to the pedicle of the suspensorium in the Amphibia. From this point the palato-quadrate cartilage extends backwards, as a laterally compressed deep plate, the posterior and inferior extremity of which gives attachment to the mandible. The dorsal and anterior angle of this plate is attached only by ligament to the postorbital process, in the fœtus, but appears to articulate therewith in the adult. I think that there can be no doubt that this upward and backward extension of the palato-quadrate cartilage answers to the *otic process* in the amphibian. It has similar relations to the posterior division of the seventh nerve; and between it and the hyoidean arch lies the spiracle, in correspondence with its homologue the tympano-eustachian passage. The dorsal and posterior edge of this process no less clearly corresponds with the spiracular cartilage in *Cestracion*, otherwise absent in *Notidanus*. The hyoidean arch is attached to the periotic region of the skull. It is very slender; and though closely bound by ligament to the mandibular arch, close to the articulation of the mandible, it can contribute little or nothing to the support of the latter. Remove the great otic process of the palato-quadrate arch of *Notidanus*, and bring its quadrate end further forward, and the result would be a typically amphistylic skull, such as exists in the larval *Siredon* and *Triton*[*].

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* See Gegenbaur, *op. cit.*

The relations of the skulls of *Notidanus*, *Cestracion*, and *Ceratodus* may be thus expressed:—

Notidanus most nearly approaches the amphistylic skull, such as exists in all the autostylic Vertebrata in the embryonic state; but it is considerably altered by the development of a great otic process from the mandibular arch.

In *Cestracion* the palato-quadrate has become massive, and, in the region of the pedicle, is firmly united with the skull, while the otic process is a separate cartilage, connected only by ligament with the postorbital process above and with the palato-quadrate below.

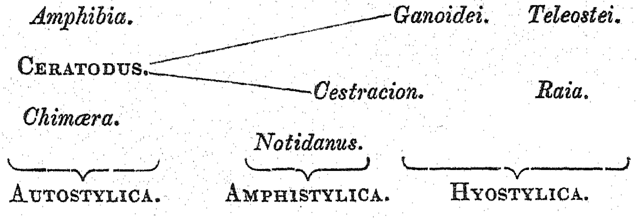
In *Ceratodus* the palato-quadrate has coalesced with the skull both by its pedicle and by its otic process; and the same change occurs in the autostylic skulls of the Amphibia.

In the ordinary Plagiostomes, on the other hand, the palato-quadrate becomes smaller and more freely united with the skull. The otic process (=spiracular cartilage) is smaller, and the hyomandibular takes a larger and larger share in suspending the mandibular arch to the skull, which is therefore eminently hyostylic.

Turning now to osseous fishes, the skull which presents the nearest resemblance to *Ceratodus* is that of *Polypterus*. This will be obvious to any one who studies the excellent description of the chondrocranium of this fish given by Dr. Traquair[†].

But in the character of the palato-quadrate arch and the great relative size of the hyomandibular, the skull is as thoroughly and completely hyostylic as is that of any other existing Ganoid or Teleostean.

Thus, having regard only to the structure of the cranium, the relations of *Ceratodus* may expressed as follows:—



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[*] P. Z. S. 1874, pl. xxxi. figs. 1 & 2.

[†] "The Cranial Osteology of *Polypterus*," Journal of Anatomy and Physiology, 1870.

III. *The Pectoral Limb.*

In the memoir cited, Dr. Günther describes the limbs of *Ceratodus* and their skeleton as follows:—

"The limbs consist of two pairs of paddles, similar in appearance to the termination of the tail; viz. a longitudinal axis, formed by the endoskeleton and muscles and covered with scales, is surrounded by a broad rayed fringe. These paddles are structurally identical with the fins of *Lepidosiren*; only the axis and also the fringe are much dilated. The pectoral and ventral paddles taper to a fine point, the former being longer than the head, the latter rather shorter. The ventral paddles are inserted at a short distance in front of the vent" (p. 515).

"The paddle is joined to the scapular arch by an elongate, flattish, slightly curved cartilage; its proximal end has a glenoid cavity, fitting into the humeral condyle; the joint is simple, free, allowing of a considerable amount of motion, its parts being held together by a ligament fastened round its circumference. This is the only true joint in the limb, all the other parts being fixed to one another by connective tissue. I consider this cartilage to be the forearm; a horizontal section along its longitudinal axis does not show any primary division. The next following cartilage forms the base of the paddle; although externally it appears as a single flat, broad, short piece, unevennesses of its surface indicate that several primary pieces are coalesced in it.

"I am confirmed in this view by a horizontal section, in which the lines of the former divisions are preserved in the shape of tracts of a white connective tissue. Three such divisions may be distinguished, corresponding to the three carpals of most Plagiostomes *. If this determination is correct, then the antibrachial cartilage just described is not represented in that order.

"The remaining framework of the paddle shows an arrangement unique among the Vertebrata. From the middle of the basal cartilage a series of about twenty-six subquadrangular pieces takes its origin, forming a longitudinal axis along the middle of the paddle to its extremity. The pieces become gradually smaller, and are scarcely distinguishable towards the end of the paddle. On the two posterior corners of each piece a branch is inserted, running obliquely backwards towards the margin of the fin; the branches of the first eight or twelve pieces are three-jointed, the remainder two-jointed, the last having no branch at all. Slight irregularities, such as the origin of two branches from one side of a central piece, occur, as also several four-jointed branches being inserted immediately on the basal cartilage" (pp. 532–3).

In general, this description suits the pectoral fins of the specimen I have described very well. Mine, however, has only twenty median cartilages. All but the very last bear lateral rays; but towards the distal end of the fin these become minute, and consist of a single piece. Moreover the distal joints are much more slender, especially the last. A more important point is that the second shows no trace of such divisions as those described by Dr. Günther. To make sure of this I made a thin microscopic section of this cartilage on the right side, and thereby satisfied myself of the homogeneity of the cartilage of which it is composed.

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* Pro-, meso-, and metapterygium of Gegenbaur.

I find no true joint between the proximal median piece and the scapular arch, the connexion between the two being effected by a solid fibrous mass.

Again, the "slight irregularities" in the distribution of the rays, in respect of the median pieces, of which Dr. Günther speaks, are constant peculiarities of no small importance. This becomes obvious when the fin of *Ceratodus* is compared with that of other fishes. But before proceeding to this point I must make a few remarks on the normal and primitive position of the vertebrate limb, and on the changes from that normal position which take place in fishes on the one hand, and the higher Vertebrata on the other, as, for want of attending to this fundamental matter, grave errors have crept into the interpretation of the parts of the limbs of different vertebrates.

The fins occupy the normal position in such a fish as *Scyllium*. When the axis of the body is horizontal the plane of the fin is also horizontal. Its upper surface is covered by a continuation of the dorsal integument, and its lower surface by that of the ventral side of the body. The distinctive spotting of the dorsal aspect in the Dogfish makes this very plain; therefore, to adopt the nomenclature which I some time ago proposed, the convex thick edge of the fin is præaxial, while its concavo-convex thin edge is postaxial, and its two aspects look respectively upwards and downwards.

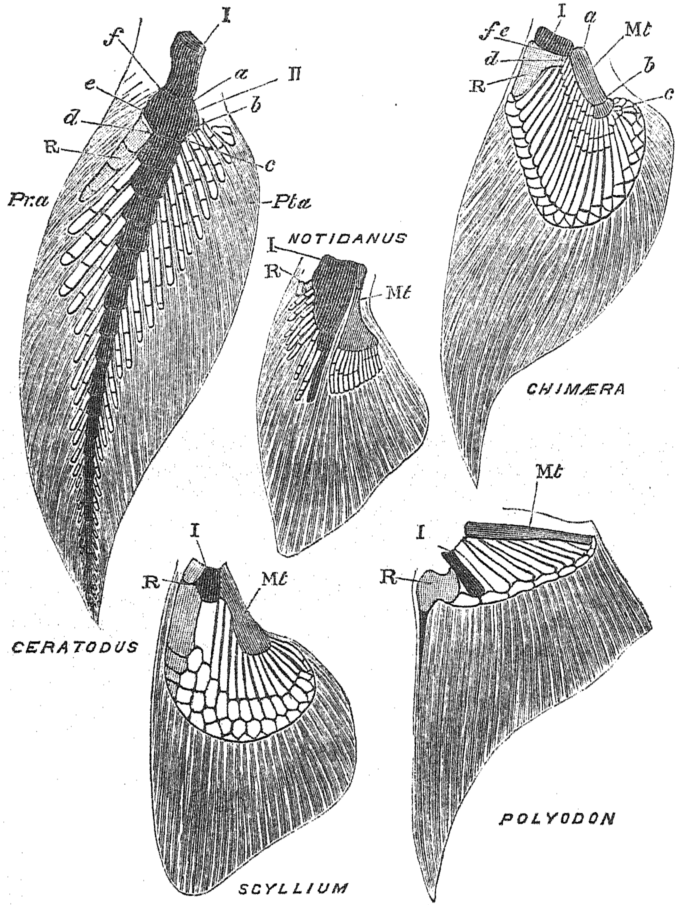
In *Ceratodus*, however, the fin has undergone a rotation upon its axis, in virtue of which its proper ventral surface looks more or less outwards, and its proper dorsal surface more or less inwards; and at the same time the præaxial edge is turned upwards, while the postaxial edge is turned downwards. This is very marked when the fin is applied to the trunk; but the primitive disposition of the surfaces and edges of the limb becomes obvious when the fin is made to stand out at right angles to the axis of the body.

In *Acipenser*, as in any Teleostean fish, the rotation becomes still more marked; and divarication of the fin does not greatly diminish it, by reason of the articulation of the præaxial fin-ray with the pectoral arch at a point higher than the proper glenoid cavity.

When *Ceratodus*, or a Teleostean fish, is placed side by side with a Urodele Amphibian, such as *Menobranchus*, in which the fore limb naturally takes a position nearly parallel with the axis of the trunk, the manus being directed backwards, nothing is more natural than to imagine that the outer and inner aspects and the dorsal and ventral edges of the two correspond.

But a very little consideration will show that nothing can be more erroneous; for the outer surface of the *Menobranchus* limb is its proper dorsal aspect, and the inner surface is its ventral aspect, as will be seen the moment the limb is placed at right angles with the trunk. In fact, though in the amphibian, as in the fish, the limb has undergone a twist, the direction of its rotation is exactly contrary to that which has occurred in the fish. Taking the left limb in each case, the normal fin would have to be turned in the direction of movement of the hands of a watch to bring it to the teleostean position,

Fig. 10.



The left pectoral fins of *Ceratodus forsteri*, *Notidanus cinereus* (fœtal), *Scyllium canicula*, *Chimæra monstrosa*, and *Polyodon folium*.

The præaxial (*Pr.a*) and postaxial (*Pt.a*) margins of all are turned in the same direction; *R*, the præaxial ray (propterygium of Gegenbaur); *Mt*, the metapterygium; I, the basal or proximal joint of the axial skeleton.

while it would have to be turned in the contrary way to bring it into the amphibian position. Hence the præaxial edge in the teleostean fin is dorsal, while in the amphibian limb it is more or less ventral;

and the skeletal elements on the dorsal side of the axis of the fish-fin answer to those on the ventral side of the axis in the amphibian limb.

As Dr. Günther has observed, the contour of the fin in *Ceratodus* is somewhat like that of a sickle. The præaxial edge is convex forwards and rather thicker, especially at its proximal end, than the posterior edge, which is concave backwards in its distal and convex in its proximal half. The apex of the fin is slender and recurved. A rounded and narrowed neck unites the limb with the trunk.

Thus the limb, as a whole, is essentially unsymmetrical when its postaxial and præaxial halves are compared. A corresponding asymmetry is strikingly obvious in the skeleton when it is prepared by removing the integument and muscles of the dorsal face, while the undisturbed condition of the parts is preserved by leaving the ventral integument and muscles untouched (fig. 10).

It will be seen that, on the præaxial side (*Pr.a*), each of the subquadrate segments of the median part of the skeleton, except the first and the terminal segments, gives attachment by its distal angle to a single jointed ray. The proximal or first ray (*R*) is much stouter than any of those which succeed it; and all take a direction approximately parallel to one another, their long axes forming an acute angle with that of the series of median segments. In the distal portion of the fin, the postaxial rays have a similar arrangement, and are only more slender than the præaxial rays. But the second segment bears no fewer than five rays. Of these, the proximal, which is shortest and slenderest, stands out at right angles to the axis of the series of median segments; while the others are gradually inclined at a less and less angle to it. The third segment and the fourth each carry two postaxial rays; the rest have but one.

Dr. Günther's figures show that, in his specimen also, the fourth and the third segments each bore two postaxial rays; but there are only four attached to the second segment, and all these are represented as if they had nearly the same inclination to the axis of the fin as the præaxial rays.

To dwell so strongly upon these minutiæ may seem to be making a great deal of a very small matter; but its importance becomes manifest when the fin of *Ceratodus* is compared with that of other fishes.

In my "Preliminary Essay on the systematic arrangement of the Fishes of the Devonian epoch"[*], I made use of the term "Crossopterygian" to express a peculiarity which is very strikingly manifest in the fishes to which I applied it, the fin-rays of the paired fins being disposed, like a fringe, round an oval, or elongated, central space covered with scales. The Crossopterygii, however, were not defined by this character alone; and hence the fact that truly fringed fins are found beyond the limits of that group does not interfere with its perfectly natural character. In strictness, all fishes which possess paired fins are Crossopterygian in so far as the fin-rays always fringe the edges of the fin; and they differ only in the relative extent of the central area, on which the fin-rays do not encroach.

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[*] Memoirs of the Geological Survey of the United Kingdom, decade x. 1861.

All the Chimæroids and Plagiostomes are eminently crossopterygian so far as their fins are concerned; and therefore we might expect to find in the skeleton of the pectoral fins of these fishes a modification of the skeleton of that of *Ceratodus*. But in most of these fishes the skeleton of the fins has undergone such an amount of metamorphosis that it is difficult to reduce it to the type of *Ceratodus*. In *Notidanus**, however, the skeleton of the pectoral fin affords the key to the nature of this metamorphosis. Here (fig. 10) there is an axial cartilage, the broad proximal end of which articulates with the pectoral arch. Distally it diminishes in diameter, and ends by a truncated face, with which another slender cylindrical cartilage, also axial in position, is articulated.

I take these two cartilages to represent the shrunken axis of the fin of *Ceratodus*. The præaxial basal angle of this axial mass is occupied by a distinct cartilage. Whether this represents the proximal axial cartilage of *Ceratodus*, or whether it is the proximal præaxial ray, is not clear.

The præaxial edge of the principal axial cartilage, at some little distance from this piece, presents a series of notches, with which are articulated a corresponding number of præaxial rays, while, as has been already stated, a single ray is articulated to the base of the terminal axial cartilage. The uppermost or proximal præaxial ray is two-jointed and broader than the others. On the postaxial side there is a triangular cartilage (*Mt*), wide distally, very narrow proximally, where it is connected with the proximal end of the axial cartilages. Twelve postaxial rays are articulated with the wide distal edge of this cartilage. I conceive that this triangular postaxial cartilage is formed by the coalescence of the axial ends of the postaxial rays.

The fin-skeleton of *Notidanus* thus results, in the simplest possible manner, from the shortening of the axis of such a fin-skeleton as that of *Ceratodus* and the coalescence of some of its elements.

In *Cestracion* (fig. 11) the same process is carried a step further. Here there is a large cartilage (I) which articulates with the pectoral arch by a concave facet, and corresponds with the proximal axial cartilage of *Ceratodus* and *Notidanus*. United by ligament with its hinder concave margin is the triangular postaxial cartilage (*Mt*), which obviously answers to the similarly shaped postaxial cartilage of *Notidanus*, and which bears a series of postaxial rays, of which the first is directed almost at right angles to the axis of the fin, as in *Ceratodus*. The first præaxial ray (*R*) is very large and bifurcates distally. The ray which is attached to the distal angle of the axial cartilage probably answers to the ray-like termination of the axial skeleton in *Notidanus*; but it is not distinguishable from the rest.

In the Dogfish (*Scyllium*) (fig. 10) the further shortening of the axis gives rise to still greater changes. The axial cartilage (*meso-*

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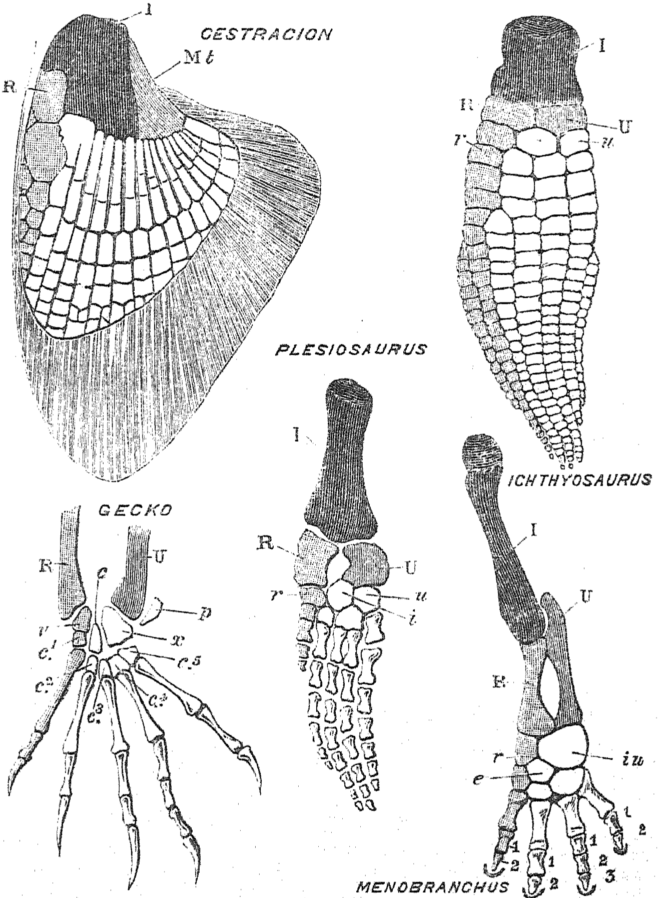
* The figure represents the fin of the fœtal *Notidanus* to which I have already referred. The figure of the fin of an adult of the same species given by Gegenbaur (Untersuchungen, Heft ii. Taf. ix. fig. 2) shows essentially the same structure.

pterygium of Gegenbaur, I) is relatively small; but the enlarged post-axial cartilage (*metapterygium, Mt*) has extended upwards along the

Fig. 11.



The left pectoral fin of *Cestracion philippi* (letters as before), the left fore limbs of *Ichthyosaurus*, *Plesiosaurus*, *Menobranchus*, and the left manus of *Gecko verus*.

I, humerus; *R*, radius; *U*, ulna; *r*, radiale; *i*, intermedium; *u*, ulnare; *c*, centrale; c^1, c^2, c^3, c^4, c^5, distal carpals; 1, 2, 3, phalanges of *Menobranchus*. In *Gecko* it is uncertain whether x represents the intermedium and the ulnare coalesced as in *Menobranchus* (*i u*), or whether x is the intermedium and p is the ulnare, occupying the place of a pisiform bone.

postaxial face of the first, until it has not only reached the articular surface of the pectoral arch, but furnishes a large part of the articular cavity. In like manner the proximal præaxial ray (*propterygium*, *R*) has ascended along the præaxial face of the axial cartilage, until it also is able to furnish a facet which completes the anterior part of the cup for the condyle of the pectoral arch.

In *Squatina*, similar modifications have occurred; but the axial cartilage remains large, and the large præaxial and postaxial cartilages are directed respectively forwards and backwards, in accordance with the form of the vastly expanded fin.

In *Raia*, yet further expansion is obtained by the separation of the axial and postaxial cartilages and the interpolation of postaxial rays between them. The proximal ends of these enter into the articulation, as the great postaxial cartilage had already done.

The interpretation of the skeleton of the pectoral fin of *Chimæra* presents some difficulties. This skeleton consists (fig. 10) of:—(1) a proximal cartilage (I), which articulates by an excavated surface with the condyle of the pectoral arch; (2) a flat, curved, elongated middle cartilage (*Mt*), which is inclined backwards; (3) a small semilunar distal cartilage (*c*), which fits onto the convex distal end of the last. At the end of the convex posterior edge of the distal cartilage is a small cartilaginous ray, consisting of a long basal and a short terminal segment. Similar rays, which gradually become longer, follow this along the free convex edge of the distal cartilage and that of the middle cartilage; but the proximal end of the latter bears a much stronger ray, with a wide base (*R*), which for the most part unites with the ventral edge of the proximal cartilage (I), but is connected with the middle cartilage (*Mt*) by its posterior produced angle.

There can, I think, be no doubt that the proximal cartilage (I) in *Chimæra* answers to the proximal cartilage in *Ceratodus*. The small proximal postaxial cartilages also exactly correspond; and the large proximal præaxial rays no less closely answer to one another. But if this be so, it follows that the whole skeleton of the fin in *Ceratodus* is represented in that of *Chimæra*. The distal cartilage (*c*) in *Chimæra* is the result of the coalescence of the bases of a certain number of the postaxial rays, as is obvious on tracing the series round.

Hence it would appear that all that can represent the series of median segments except the first is the middle cartilage (*Mt*). It further seems probable that this middle cartilage in great part, if not wholly, represents the second segment of the *Ceratodus* limb. The postaxial edges, *a b* and *b c*, correspond closely; but the edge *e f*, long in *Ceratodus*, is reduced to nothing in *Chimæra*; while the edge *c d*, occupied exclusively by the third segment in *Ceratodus*, is greatly elongated and bears all the præaxial rays in *Chimæra*.

In order to change the skeleton of the pectoral fin of *Ceratodus* into that of *Chimæra*, all that will be necessary, if this comparison is correct, is that the third and following median segments of the former shall be gradually reduced, either by abortion or coalescence with the second, more and more postaxial fin-rays becoming attached to the postaxial edge of the second segment, and more and more of the præaxial rays to its præaxial edge. At the same time the first præaxial ray, enlarging backwards and forwards, intercepts the proximal ends of two or three of the following rays, and comes into connexion with the proximal segment.

The difficulty which arises out of this apparently natural interpretation of the parts of the skeleton of the fin of *Chimæra* consists in this—that it leads to a doubt as to the true nature of the postaxial cartilage (*Mt*) in *Scyllium*, and therefore in other Plagiostomes. For this metapterygial cartilage cannot at the same time represent coalesced postaxial rays, as the analogy of *Notidanus* would suggest, and the second joint of the axial skeleton, as the analogy of *Chimæra*, on the interpretation just given, indicates. If, following the analogy of *Notidanus*, we consider *Mt* in *Chimæra* to be formed of coalesced postaxial fin-rays, then the structure will present no difficulty, but will come very near that presented by the fin of *Cestracion*. The study of the development of the parts can alone solve this problem; but I am inclined provisionally to adopt the latter hypothesis, plausible as the former seems.

Polypterus and *Polyodon* furnish the best connecting links between the Plagiostome fin and that of the other Ganoidei and the Teleostei. In *Polypterus*, the *Scyllium* type is essentially preserved. In *Polyodon* and all other Ganoids of which the fin-structure is known, the type is essentially that of the Rays, in so far as fin-rays enter into the glenoid articulation behind the proximal median segment (I). These and many other special modifications of the fish's fin have been carefully worked out by Gegenbaur*, to whose excellent descriptions I have nothing to add.

If the interpretation which I have here endeavoured to make good is correct, it is clear that, as Gegenbaur has suggested, *Ceratodus* presents us with the nearest known approximation to the fundamental form of vertebrate limb, or *archipterygium*. But the asymmetry of the skeleton of the fin of *Ceratodus*, and the differences between its distal and its proximal portions, as well as the fact that the proximal median segment has no rays, appear to indicate that the veritable *archipterygium* has undergone a certain amount of modification even in *Ceratodus*. Analogy leads to the suspicion that a still more archaic fish than *Ceratodus* would have as many pairs of rays as median pieces. In this condition the skeleton would be made up of homologous segments, which might be termed *pteromeres*, each of which would consist of a *mesomere* with a præaxial and a postaxial *paramere*. And as this is the actual state of a great portion of the skeleton of the fin in *Ceratodus*, it may perhaps be permissible to carry speculation as to the primitive condition of the vertebrate limb thus far. Dr. Günther and Professor Gegenbaur go a step further, and suggest that even this *archipterygium* may be the secondary product of the coalescence of many longitudinal cartilaginous elements, which are united by their bases, while they fray out, as it were, at regular intervals towards the distal end of the limb. In this case,

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* 'Untersuchungen,' Heft ii. "Brustflosse der Fische," 1865.

Gegenbaur has most ingeniously suggested that the pectoral arch, with its limb, would correspond with a branchial arch and its rays.

It will be observed that the view of the special homologies of the elements of the skeletons of the fins of fishes which I have ventured to put forth differs, fundamentally, both from that suggested by Dr. Günther and from that advanced by Gegenbaur, either in its original form or as he has modified it subsequently to the discovery of *Ceratodus*.

The former says (*l. c.* p. 533):—"When I designated the arrangement of the parts of this pectoral skeleton unique, I did not mean to convey the idea that no homological relation could be pointed out between the parts of the pectoral skeleton of *Ceratodus* and that of other fishes. It is quite evident that we have here a further development of the simple pectoral axis of *Lepidosiren* in the direction towards the Plagiostomes. The pectoral skeleton of *Lepidosiren paradoxa* consists merely of the central series of cartilages of *Ceratodus*; there is no fin-like expansion of the skin of the pectoral limb, which is a simple tapering filament. In *Lepidosiren annectens* this pectoral filament is bordered by an expansion of the skin along its lower edge; and even minute fin-rays are imbedded in each lamina of the fold; in order to support this low, one-sided, rayed fringe, very small, single-jointed cartilages are added to the axis*. The fin is still more developed in *Ceratodus*: it has become a broad, scythe-shaped paddle, dilated by a fold of the skin, with two layers of fin-rays surrounding it in its entire circumference; therefore supporting cartilaginous branches are added on both sides of the axis; and most of the branches are composed of several joints, in order to reach the more distant parts which require the support."

This is the exact converse of the view of the relations of *Lepidosiren* and *Ceratodus* which, in agreement with Gegenbaur, I am disposed to take. The fin of the former appears to me to be a reduced and metamorphosed state of the more primitive condition retained in *Ceratodus*.

Dr. Günther goes on to say that "the arrangement of the limb-skeleton of *Ceratodus* is foreshadowed in the pectoral fin of *Acipenser*." On the contrary, in my judgment, the pectoral fin of *Acipenser* has been derived by much modification from a *Ceratodus*-like type.

In referring to those points in which I venture to dissent from Professor Gegenbaur's interpretation, I cannot refrain from expressing my sense of the very great value of his investigations into the morphology of vertebrate limbs, and my grateful indebtedness to the rich fund of new facts and new ideas which they contain. However, I found myself unable fully to accept his theory of the fish's fin and the vertebrate limb generally, in its original form; and I expressed my hesitation and its grounds in the German version of my 'Manual of the Vertebrata'†. Gegenbaur's later view is concisely stated in his 'Grundriss der vergleichenden Anatomie,' 1874, p. 493, in the following words:—

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* Four or five of these ray-bearers are obliquely attached to each joint of the axis (Peters, Müller's 'Archiv,' 1845, Taf. 2. fig. 2).

† 'Handbuch der Anatomie der Wirbelthiere,' übersetzt von Dr. F. Ratzel (Breslau, 1873), pp. 34, 35.

"The very various forms of the skeleton of the free limbs are deducible from a fundamental form of which only a few instances remain, and which, as representing the first and lowest condition of the fin-skeleton, I term the *archipterygium*. This is represented by a jointed cartilaginous *stem*, articulated with the pectoral arch and giving attachment, on each side, to a series of likewise jointed pieces, the *radii*. The whole structure, resembling a pinnate leaf, is singularly like the supporting apparatus of many Selachian gills, and thus throws a gleam of light upon the phylogeny of the limbs.

"*Ceratodus* presents this form of fin-skeleton, which was perhaps usual among the *Crossopterygidæ*, at present represented only by *Polypterus*. The biserial rays of the fin undergo different modifications. Among the Dipnoi the medial [postaxial] rays are retained in the form of thin rods of cartilage; while in the Selachians the lateral [præaxial] rays attain a considerable development and constitute the greater part of the massive fin-skeleton. Of the medial [postaxial] rays but few remain, though they are sufficiently distinct to sanction the assumption of a former more extensive biserial arrangement of rays on the stem of the fin."

The *metapterygium* Gegenbaur considers to answer to the axial skeleton of the *archipterygium*. The *propterygium* is formed by the union of the proximal præaxial fin-rays. The *mesopterygium* is formed by a certain number of the succeeding præaxial fin-rays.

The only part of this interpretation with which I can agree is the determination of what Gegenbaur names the propterygium as the representative of the proximal præaxial fin-ray or rays in most cases, but not in *Chimæra*, and probably not in *Notidanus*.

In my judgment, the mesopterygium of Gegenbaur is the proximal piece of the axial skeleton, which constantly retains its primary articulation with the pectoral arch. His propterygium represents the proximal præaxial fin-ray, and his metapterygium the proximal postaxial fin-ray in almost all cases; and the *ichthyopterygium*, as the typical fish-fin may be termed, differs from the archipterygium not by the more or less complete suppression of the postaxial rays, but by the general abbreviation of the whole skeleton and the gradual connexion of more or fewer fin-rays (*parameres*) with the pectoral arch.

In the effectual discharge of the function of the fish's fin, increase of breadth is needed; and this increase of surface is obtained by the gradual approximation of more and more lateral elements of the archipterygium to the shoulder-girdle.

Professor Gegenbaur has extended his theory of the limbs to the higher Vertebrata. He conceives that the axis of the archipterygium (which he considers to be the homologue of the metapterygium of the Selachian) is represented by the series of bones which is formed by the humerus, the radius, the radial segments of the carpus, and the radial digit or pollex; while the ulna, the radial segments of the carpus and the ulnar digit, the other carpal bones, and the fourth, third, and second digits represent so many præaxial rays. The very serious objection that this hypothesis makes the radius and the radial digit postaxial, while, as a matter of fact, in every vertebrate animal it is præaxial, is met by the assumption of a torsion of the humerus. But I must confess that I am wholly unable to satisfy myself of the existence of any torsion of the humerus capable of bringing about the effect attributed to it in any vertebrated animal; and, moreover, if such torsion has brought about the observed position of the manus and pes in the higher Vertebrata, any reversal of that torsion would destroy the homology of the pollex and the hallux—which is surely out of reach of doubt.

I am disposed to think, though I am far from imagining that the hypothesis can at present be demonstrated, that the higher vertebrate limb has arisen from the archipterygium in another and simpler method.

According to Gegenbaur's view, the higher vertebrate limb is the result of further progress, in the same direction, of the metamorphosis which has given rise to the ichthyopterygium. But this appears to me to be highly improbable. The ichthyopterygium is specialized *pari passu* with the other peculiarities of piscine structure, and is not developed in the Dipnoi, which are the nearest allies of the Amphibia. Moreover the higher vertebrate limb, which may be termed the *chiropterygium*, as an organ of support and prehension, requires length, strength, and mobility of its segments—conditions exactly the opposite of those which give the ichthyopterygium its special utility.

Hence, as the most highly specialized forms of ichthyopterygium result from the shortening of the skeleton of the fin, the approximation of its distal elements to the shoulder-girdle, and the multiplition of its rays, we might expect that the chiropterygium would take its origin by the lengthening of the axial skeleton, accompanied by a removal of its distal elements further away from the shoulder-girdle, and by a diminution in the number of the rays.

The parts which are traversed by a line drawn through the humerus, the intermedium, the centrale, the third distal carpal, and the third digit in the cheiropterygium may be regarded as so many mesomeres, representing the axis of the archipterygium. Two pairs of parameres are retained on each side. The præaxial are:—(1) the radius, the radiale, the first distal carpal, and the pollex; (2) the second distal carpal and the index. The postaxial parameres are:—(1) the ulna, the ulnare, the fifth distal carpal, and the digitus minimus; (2) the fourth carpal and the annularis.

In fig. 11 the skeleton of the pectoral fin of *Cestracion* is represented side by side with the skeleton of the fore limbs of *Menobranchus*, *Ichthyosaurus*, *Plesiosaurus*, and *Gecko*; and the shading of the different parts of the ichthyopterygium is repeated in what I suppose to be the homologous elements of the chiropterygium. In the case of *Menobranchus*, however, it is possible that the true pollex is suppressed, and that the actual radial digit represents the second of the pentadactyle limb, and therefore should have been left unshaded.

In accordance with the view thus suggested, the humerus in the chiropterygium is the homologue of the proximal mesomere or joint of the axis of the archipterygium, while the radius and the ulna are the homologues of the proximal ends of præaxial and postaxial parameres of the archipterygium.

The confirmation or refutation of this hypothesis is to be sought in development, and in the condition of the limbs in those Palæozoic Amphibia which may have more nearly approximated to Dipnoi than any existing or extinct forms at present known. I suggest it mainly in the hope of stimulating investigation in both these directions.

IV. *Taxonomy of* Ceratodus, *and Remarks on the Classification of Fishes.*

The indications afforded by the brain, the skull, and the limbs of *Ceratodus* are sufficient to show that it occupies a curiously central position among the Ichthyopsida, being allied on one side to the Amphibia, on another to the Chimæroidei and Plagiostomi, and on yet another to the Ganoidei—especially to that group of the Ganoids which I have termed *Crossopterygidæ*, and to the affinities of which with *Lepidosiren* I called attention in 1861.

But even *Dipterus*, which approaches *Ceratodus* and *Lepidosiren* so closely in its dentition and in the form of its fins, is far more similar to *Polypterus* and *Amia* in other respects; and there is, at present, no reason to believe that any of the Crossopterygian Ganoids possessed other than a hyostylic skull, or differed from *Polypterus* in those respects in which *Polypterus* differs from the existing Dipnoi. All known Crossopterygians have jugular plates, of which there is no trace in the Dipnoi. And as to the position of the anterior nares, which appear to have been situated on the under face of the broad snout, not only in *Dipterus*, but in *Osteolepis* and *Diplopterus*, I have shown above that, so far from being a diagnostic character of the Dipnoi, it is simply an embryonic feature retained in them, the Selachians, and very probably in many of the early Ganoidei. On the other hand, in *Amia*, there is an even closer approximation between the Ganoids and the Teleosteans than can at present be shown to exist between any Ganoids and the Dipnoi; while the differences between the Dipnoi and the Chimæroidei, and between the Chimæroidei and the Plagiostomi respectively, are not less than those between the Ganoids and the Dipnoi.

It seems to me, therefore, that by forming the Dipnoi, Ganoidei, Chimæroidei, and Plagiostomi into a group of "Palæichthyes," from which the Teleostei are excluded, as Dr. Günther proposes to do, the differences between the Teleostei and the other hyostylic fishes are brought into undue prominence, and that it is better to retain the Müllerian groups of Dipnoi (*Sirenoidei*, Müller), Ganoidei, Teleostei, Plagiostomi, and Chimæroidei (*Holocephali*, Müller) as equivalent and distinct natural assemblages.

In discussing any system of classification, however, it must be recollected that known forms certainly represent but a portion, and probably a small portion, of those which have existed, and that the most natural groups are therefore, to a great extent, the result of the influence of extraneous, and what may be properly termed accidental, conditions.

It has occurred to me that, in the present state of science, it is very desirable to have some mode of stating the facts of morphology in a condensed and comprehensible form, which shall be purely objective and free from speculation; and I now proceed to illustrate my meaning by drawing up a scheme of the morphology of the Ichthyopsida.

Looking at the animals included under this head as a whole, or at the development of any of the higher members of the group, it is observable that they present a certain series of stages of differentiation marked by the broad characters of the skull, the nature of the olfactory and respiratory organs, and the development or non-development of an opercular fold of the integument.

Thus the skull either retains its primitive segmentation (*Entomocrania*), or the primitive segmentation is lost, and a chondrocranium is developed (*Holocrania*). There are two external nostrils (*Amphirhina*) or only one (*Monorhina*).

A *pneumatocœle*, or air sac, which may become either an air-bladder or a lung, is developed (*Pneumatocœla*), or not (*Apneumatocœla*); and a fold of the integument may cover the branchial apertures (*Operculata*), or not (*Inoperculata*).

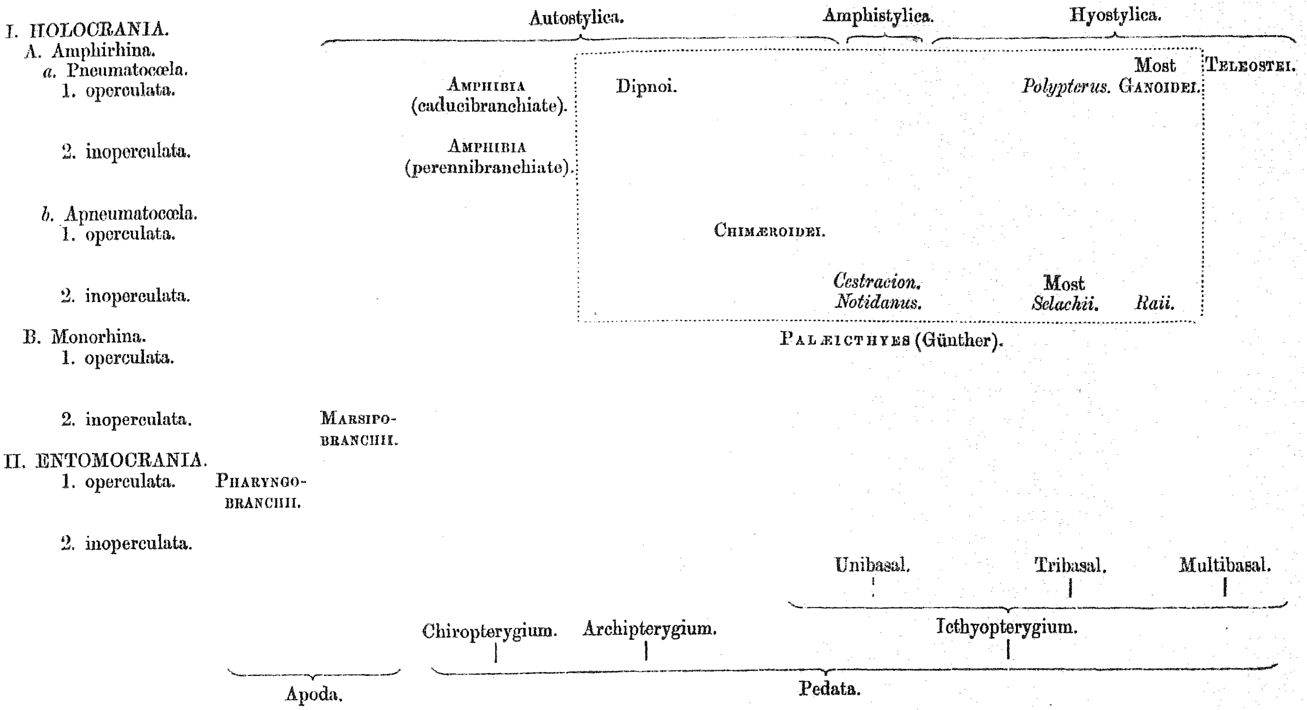
The Ichthyopsida also exhibit a series of stages of differentiation of the limbs, being either apodal or pedate; and, when pedate, having the limb-skeleton constructed upon the type of the archipterygium, or on that of the icthyopterygium, or on that of the chiropterygium.

Moreover, when the limb is an ichthyopterygium, it may possess one, or at most two basal elements, which articulate with the pectoral arch (unibasal), or there may be three (tribasal), or there may be many (multibasal), in accordance with the greater and greater divergence of the fin from the archipterygial type.

The chondrocranium may be constructed upon either the amphistylic, the hyostylic, or the autostylic plan.

Now, if the stages of general differentiation be indicated by points on a vertical line from which horizontal lines are drawn, and the stages of subordinate differentiation of the skull and limbs be indicated by points on a horizontal line from which vertical lines are drawn, we shall have vertical series of intersections indicating general differentiation, and horizontal series of intersections indicating special differentiation. Every known form will occupy some given intersections, and the unoccupied intersections will indicate unfulfilled, or unknown, possibilities of organization.

The following Table exhibits the groups of the Ichthyopsida arranged according to this scheme.


I. HOLOCRANIA.
A. Amphirhina.
a. Pneumatocœla.
1. operculata.
2. inoperculata.
b. Apneumatocœla.
1. operculata.
2. inoperculata.
B. Monorhina.
1. operculata.
2. inoperculata.
II. ENTOMOCRANIA.
1. operculata.
2. inoperculata.
Autostylica.
Amphistylica.
Hyostylica.
AMPHIBIA (caducibranchiate).
AMPHIBIA (perennibranchiate).
Dipnoi.
Most GANOIDEI.
Polypterus.
TELEOSTEI.
CHIMÆROIDEI.
Cestracion.
Notidanus.
Most Selachii.
Raii.
PALÆICTHYES (Günther).
MARSIPOBRANCHII.
PHARYNGOBRANCHII.
Unibasal.
Tribasal.
Multibasal.
Chiropterygium.
Archipterygium.
Icthyopterygium.
Apoda.
Pedata.

January 18, 1876.

Robert Hudson, Esq., F.R.S., V.P., in the Chair.

The following papers were read :—

1. On a Peculiarity in the Carotid Arteries, and other Points in the Anatomy, of the Ground-Hornbill (*Bucorvus abyssinicus*). By A. H. Garrod, M.A., F.Z.S., Prosector to the Society.

[Received December 10, 1875.]

A specimen of *Bucorvus abyssinicus* having recently died in the Society's Gardens, I have had the opportunity of examining the anatomy of that genus for the first time. In all respects, except the one to be referred to as regards its arterial system and a minor myological feature, it agrees with *Buceros*. As is the case in all the Bucerotidæ, there was not a trace of fat to be found on any part of the body of the adult bird, though it may be present in young individuals; and the air-cells extended so extensively among the muscles that on removing the skin no dissection was required to display each muscle from origin to insertion. The muscular tissue was also strikingly compact and dry, as in the Hares among mammals, in which animals also it is known that fat is never deposited. The oil-gland, as in *Buceros*, instead of being simply tufted, was also covered with a dense mat of short feathers, about a square inch in area.

In *Buceros*, as in most birds, the two carotid arteries, immediately they separate from their respective innominate arteries, converge, and meet before they have gone any considerable distance up the neck, to run together in the median hypapophysial canal on the anterior surface of the cervical vertebræ. In some Parrots the left carotid, instead of coursing the above-mentioned canal with its fellow, runs up along the side of the neck together with the left pneumogastric nerve to reach the head. In *Bucorvus*, in the specimen dissected by me at least *, a further extension of this peculiarity obtains; for both the carotids, instead of meeting and running together, course up the *sides* of the neck in company with the pneumogastric nerves and jugular veins of their respective sides, as they do in mammals, and in no other birds, as far as I am aware. Another peculiarity is, that these abnormally placed carotids are particularly small in calibre; and I noticed that the vertebrals were as conspicuously large, evidently to make up the blood-supply of the head.

As to the visceral anatomy, it may be mentioned that the uniformly cylindrical crop leads, through the zonary proventriculus, to the stomach, which is much like that of *Buceros*†, but more muscular, and with the dense epithelial lining much more firmly

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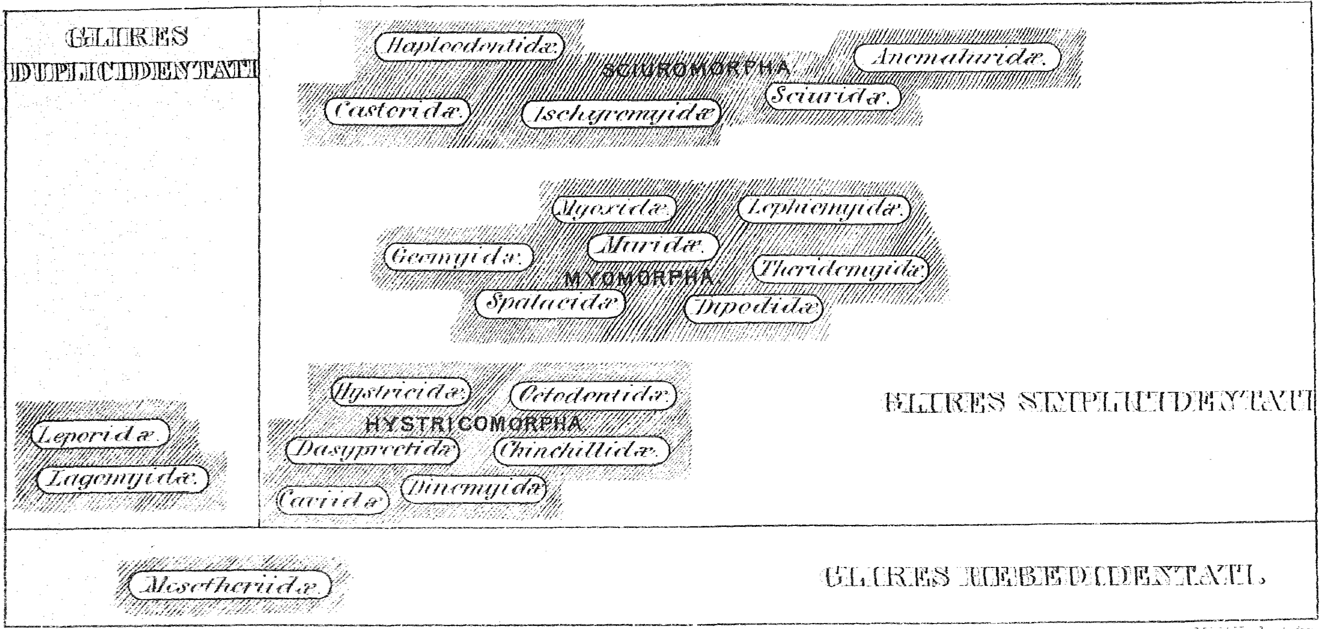
* A second specimen, since received, entirely agrees with the above description.

† *Vide* Trans. Z. S. vol. i. pl. xviii. p. 122.



M&N Hanhart imp.

CHART OF FAMILIES OF THE ORDER GLIRES.

attached. The intestines are particularly capacious, being quite an inch in diameter; they are four feet in length, and have no colic cæca connected with them. The liver has a gall-bladder; and the left of the two lobes which go to form it is a little the smaller. In the syrinx there is a pair of intrinsic muscles to the first bronchial half-ring. The tongue is almost as small as it is in the Pelicans.

Myologically, of the five muscles in the thigh, which, in my estimation, are specially significant*, the ambiens is absent, as are the femoro-caudal and the accessory femoro-caudal, the semitendinosus and the accessory semitendinosus being well represented. In this respect *Bucorvus*, therefore, differs from *Buceros* and *Toccus*, the accessory femoro-caudal muscle being present in the two latter genera. As is most probably known to many, *Bucorvus* walks, placing one foot in front of the other, whilst *Buceros* always hops, with both feet together.

2. On the Classification of the Order Glires.

By Edward R. Alston, F.G.S., F.Z.S.

[Received December 14, 1875.]

(Plate IV.)

The following attempt at a natural arrangement of the gnawing mammals is the result of a revision of the genera of that order, undertaken at the suggestion of Professor Flower, on which I have been for some time engaged.

In laying it before the Society it may be well to say at once that the proposed classification has few claims to novelty, being in fact a modification of that first suggested by Mr. Waterhouse, and since improved by Professors Gervais, Brandt, and Lilljeborg. Nevertheless I have found it necessary to propose several changes in the arrangement of the families and subfamilies, as well as rectifications in their nomenclature. I have also taken the fossil forms into consideration, and have thereby been compelled to propose the establishment of a new suborder. Lastly, I have endeavoured to bring the whole up to a level with the improved state of our knowledge, which has gained much of late years from the labours of Milne-Edwards, Gray, Günther, Leidy, Coues, and others, but, above all, from those of Dr. Peters.

The order *Glires* has always been a stumbling-block to naturalists, owing to the immense number and variety of the forms which it includes, and to their puzzling cross-relationships to one another. Nor has palæontology here yielded, save in a few instances, the same help which she has lent the student of some other orders of mammals; for most of the fossil rodents yet discovered are referable to families which still exist, and are often closely allied to recent genera.

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* P. Z. S. 1873, p. 626, and 1874, p. 111.

These difficulties were insuperable as long as zoologists placed their trust in outward appearances; and when sounder principles gained ground it was some time before the necessary anatomical data could be collected. Without detailing all the classifications which have been proposed within the last fifty years, I must briefly mention the memoirs of the four zoologists on whose labours, as already stated, the following proposed arrangement is chiefly based.

In 1839, Mr. G. R. Waterhouse, then Curator of this Society, published the first of a series of essays in which he may confidently be said to have laid down the groundwork of a natural arrangement of this order*. Unfortunately, as the mammalogist must think, this accurate and thoughtful zoologist has long since turned his attention to other departments, and only a small portion of his great work on the Rodentia ever appeared†. In his first papers Mr. Waterhouse, taking the characters of the skull and mandible as his chief guides, arranged the Rodents into three great families, the *Murina*, *Hystricina*, and *Leporina*, with twelve subfamilies. Continuing his labours for ten years, his views were naturally changed on many points. Latterly he separated the *Sciuridæ* as a group equal in value to the other two, the following being the arrangement of families and subfamilies adopted in his later writings:—

RODENTIA.

I. *Sciuridæ*.
II. *Muridæ*.
  1. Saccomyina.
  2. Dipodina.
  3. Ctenodactylina.
  4. Murina.
  5. Spalacina.
  6. Arvicolina.
  7. Bathyergina.
III. *Hystricidæ*.
  1. Hystricina.
  2. Dasyproctina.
  3. Echimyina.
  4. Octodontina.
  5. Chinchillina.
  6. Caviina.
IV. *Leporidæ*.

In 1848 Professor Gervais published an arrangement of this order, in which he instituted two principal sections or suborders‡. The first of these included the ordinary Rodents with only one pair of incisors above and below; the second consisted of those with two pairs in the upper jaw, and was consequently equivalent to Illiger's group *Duplicidenta*§. The following was Professor Gervais's arrangement of the families:—

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* "Observations on the Rodentia," Mag. Nat. Hist. iii. pp. 90–96, 184–188, 274–279, 593–600; Ann. Nat. Hist. viii. pp. 81–84, x. pp. 197–203 (1839–42). "On the Geographical Distribution of the Rodentia," P. Z. S. 1839, pp. 172–174. "Order Rodentia," Keith Johnston's Physical Atlas, Phytology and Zoology, map. 5, letterpress (1849).

† Natural History of the Mammalia, vol. ii. "Rodentia." London 1848 (includes only the families *Leporidæ* and *Hystricidæ*).

‡ Dict. Univ. d'Hist. Nat. xi. p. 202 (1848); Ann. Scien. Nat. 3^{me} sér. t. xx. pp. 245, 246 (1853).

§ Prod. Syst. Mamm. p. 91 (1811).

GLIRES.

I. *Rongeurs ordinaires.*
  1. Sciuridæ.
  2. Pseudostomidæ[*].
  3. Muridæ.
  4. Dipodidæ.
  5. Ctenomydæ.
  6. Lagostomidæ.
  7. Hystricidæ.
  8. Caviadæ.

II. *Rongeurs duplicidentés.*
  9. Leporidæ.

In 1855 appeared Professor J. F. Brandt's learned and elaborate review of the cranial structure and classification of recent Rodents[†]. On the whole he adopted Mr. Waterhouse's arrangement; but recognizing the fact that his four groups were of more than family value, he raised them to the rank of suborders. He also made several changes in the arrangement of the families and the position of some of the more doubtful forms, and imposed new names on all the divisions, which he arranged in the following order :—

GLIRES.

I. *Sciuromorphi.*
  1. Sciuroïdes.
II. *Myomorphi.*
  2. Myoxoïdes.
  3. Castoroïdes.
  4. Sciurospalacoïdes[‡].
  5. Myoïdes.
  6. Spalacoïdes.
  7. Dipodoïdes.
III. *Hystricomorphi.*
  8. Hystricoïdes.
  9. Spalacopodoïdes[§].
  10. Eriomyoïdes[||].
  11. Hemionychoïdes[¶].
IV. *Lagomorphi.*
  12. Lagoïdes.

Eleven years later Professor Lilljeborg published his admirable systematic review of this order[**]. Appreciating the great importance of the characters which separate the *Leporidæ* and *Lagomyidæ* from all other rodents, he adopted Gervais's two suborders under the names *Glires Simplicidentati* and *Glires Duplicidentati*. In the arrangement of the former he pointed out a well-marked and constant character which separates the *Myomorphi* of Brandt from both the *Sciuromorphi* and the *Hystricomorphi*, namely the complete ankylosis in the former of the lower part of the tibia and fibula. Although Professor Lilljeborg does not retain these divisions in his tabular arrangements, he observes that the *Myomorphi* include the first *six*, the *Sciuromorphi* the *seventh*, and the *Hystricomorphi* the *eighth* to *eleventh* families in the following Table:—

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[*] *Saccomyina*, Waterhouse.

[†] J. F. Brandt, "Untersuchungen über die craniologischen Entwicklungsstufen . . . und Classification der Nager der Jetzwelt," Mém. de l'Acad. Imp. de St. Pétersbourg, 6^{me} série (Sciences Naturelles), vii. pp. 127–336, 12 pls. (1855).

[‡] Containing *Geomys* and *Thomomys*.

[§] Equal to *Echimyina* and *Octodontina* of Waterhouse.

[||] *Chinchillina*, Waterh.

[¶] Equal to *Dasyproctina* and *Caviina*, Waterh.

[**] Systematisk Œfversigt af de Gnagande Däggdjuren, *Glires*. 4to. Upsala, 1866.

GLIRES.

I. *Simplicidentati.*
  1. Muridæ.
  2. Spalacidæ.
  3. Dipodidæ.
  4. Myoxidæ.
  5. Saccomyidæ.
  6. Castoridæ.
  7. Sciuridæ.
  8. Haploodontidæ.
  9. Chinchillidæ.
  10. Spalacopodidæ.
  11. Hystricidæ.

II. *Duplicidentati.*
  12. Lagomyidæ.
  13. Leporidæ.

In his recent work on Scandinavian mammals*, Professor Lilljeborg retains the above arrangement, adding a new family, allied to the Muridæ, for the reception of Milne-Edwards's genus *Lophiomys*.

As it became clear that the cranial characters of the groups proposed by Waterhouse and Brandt are liable to exceptions, and that they are connected by more or less intermediate forms, they have not been regarded with favour by recent systematic writers; nevertheless the affinities which they indicate have been very generally accepted in the arrangement of the families. But if a group is a natural one, it should not, I think, be rejected because it is difficult to characterize. The Insectivora may be taken as an example of a very natural order, of which, in Professor Huxley's words, "it is exceedingly difficult to give an absolute definition." Even if it were not possible to separate the first three of Waterhouse's great families by perfectly constant characters, they ought, as it appears to me, to be recognized as indicating three distinct lines of development. But by the help of the characters of the leg-bones, pointed out by Professor Lilljeborg, the difficulty is overcome. In the few cases in which the cranial differences fail us in separating the sciurine rodents from the murine, and the latter from the hystricine, the complete ankylosis of the lower part of the tibia and fibula in the second group comes to our aid. As far as I am aware, there is no real exception to this rule; for the union between these bones sometimes observed in the genus *Pteromys*, in aged individuals of *Castor*, and in several of the hystricine series, is totally different from the true fusion which we meet with in all the known *Myomorphi*. The first and third groups, which agree with one another in this point, are at once separated from each other by the form of the mandible, as well as by the whole type of cranial structure.

But while recognizing these groups as true and natural, I cannot consider them to have any thing like the rank of Brandt's *Lagomorphi*, and rather treat them as sections of Lilljeborg's suborder *Glires Simplicidentati*, of somewhat similar value to the sections instituted by Turner and Flower in the *Carnivora fissipedia*.

Before proceeding to some general remarks on these various divisions, it should be premised that an absolutely equal value is not here claimed for all the families and subfamilies. Such is the variety of the extent of differentiation that it appears to me that no Procrustean standard can be applied. Either we must load our memories with tribes, legions, cohorts, series, superfamilies, &c., or we must be content with divisions pretending only to an *approximate* equality of value.

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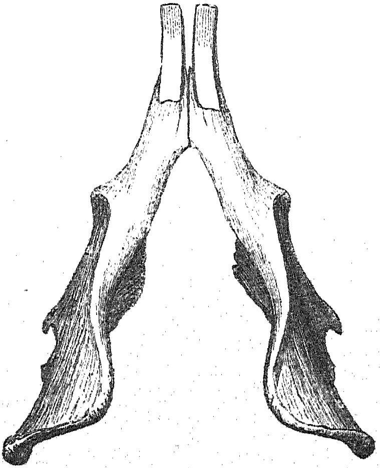
* Sweriges och Norges Ryggradsdjur, I. Däggdjuren. Upsala, 1874.

General Remarks.

The first suborder of Rodents, GLIRES SIMPLICIDENTATI, contains an enormous majority of both the recent and extinct forms, and is at once proved by its dentition to be the most highly specialized division of the order. There is only one pair of incisors above and below at all ages; and their enamel is restricted to their front surface. In the skull, the incisive foramina are moderate and separate, the optic foramina are very rarely confluent, and there is an alisphenoid canal*. The fibula is either ankylosed below to the tibia or free, and does not articulate with the calcanium. Vesicular glands are present; and the testes are usually abdominal, only temporarily descending into the scrotal pouches†.

Of this suborder the first section, *Sciuromorpha*, has for constant characters the combination of a peculiar form of mandible with the persistence of the fibula as a distinct bone throughout life. The former character at once separates it from the *Hystricomorpha*, the latter from the *Myomorpha*. In the mandible the angular portion springs from the lower edge of the bony covering of the inferior incisor, not from its outer side: and its outline is more or less rounded.

Fig. 1.



Mandible of *Arctomys marmotta.*

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* *Cf.* Turner, P. Z. S. 1848, p. 65.

† *Cf.* Owen, Anat. of Vert. iii. p. 649.

The difference between the mandible characteristic of the *Sciuromorpha* and *Myomorpha* and that peculiar to the *Hystricomorpha* will be best shown by a comparison of the figures*. In the more typical forms the infraorbital opening is not enlarged to give passage to a portion of the masseter muscle; and in all the malar extends far forward, and is not supported below by a continuation backwards of the maxillary zygomatic process. The incisive foramina are small, and confined to the intermaxillaries; the foramina of the base of the skull are proportionally small; and there is no interpterygoid canal†. The clavicles are always perfect, the posterior ridge of the scapula is strongly developed, and the acromion is broad and flattened. Externally the muffle is naked, the upper lip usually cleft, the nostrils rounded above and comma-shaped, the ears hairy, and the tail cylindrical and well haired, except in *Castor*, in which it is flattened and scaly.

The typical family, the *Sciuridæ*, easily distinguished by their postorbital frontal processes, has been divided for convenience into two subfamilies, the long-tailed arboreal Squirrels (*Sciurinæ*), and the short-tailed terrestrial Marmots (*Arctomyinæ*), though it must be confessed that their differences are merely adaptive and not very striking. The other families are all more or less aberrant, and their true affinities have been the subject of much discussion.

The first of these is the *Anomaluridæ*; and I have already‡ given my reasons for considering that it must be regarded as an undoubted though specially differentiated family of this section. The sciurine affinities of the *Haplodontidæ*, in spite of its peculiar dental and cranial characters, have been definitely established by Dr. Peters§, although Prof. Lilljeborg has strangely relegated it to the *Hystricomorpha*‖. The position of the remaining family, *Castoridæ*, has been a still more vexed question, ever since the Beaver has been extricated from the old jumble with the Musquash and the Coypu. Professor Gervais appears to have been the first to treat *Castor* as an aberrant member of the present group ¶, in which Mr. Waterhouse** and Professor Baird†† have concurred; and although these writers have not been generally followed, it seems evident to me that we must revert to their views. Professor Brandt fully recognized that in all the more important points the osteology of *Castor* agrees with that of the *Sciuromorpha*, but considers this resemblance to be negatived by the external *habitus* and manner of life, as well as by the structure of the teeth, feet, and tail‡‡. Prof. Lilljeborg places the

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* By permission of Professor Flower the illustrations have been drawn from specimens in the Museum of the Royal College of Surgeons.

† This name was proposed by Mr. Waterhouse for the fissure which in some rodents leads from the bottom of the pterygoid fossa into the orbit. *Cf.* Turner, P. Z. S. 1848, p. 63.

‡ "On *Anomalurus*, its Structure and Position," P. Z. S. 1875, pp. 88–97.

§ Monatsb. Ak. Berlin, 1864, p. 177. ‖ *Op. cit.* p. 9.

¶ Dict. Univ. d'Hist. Nat. xi. p. 203.

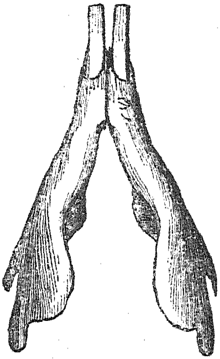
** Physical Atlas, Zool. map, 5 (letter-press).

†† North-American Mammals, p. 350.

‡‡ *Op. cit.* pp. 149, 150.

Castoridæ among the *Myomorpha*, but on the boundary between them and the *Sciuromorpha*, remarking that the fibula is stout, and remains long separate from the tibia*. But the characters of these bones seem to me to be strictly sciurine; for though they are more or less firmly attached to one another in aged individuals, yet they always appear to remain essentially distinct throughout their length. Less weight is now generally given to external characters than was the case when Prof. Brandt wrote; and the purely adaptive differentiation of the teeth, feet, and tail cannot be allowed to outweigh the numerous and important characters which are at once evident on a careful comparison of the skulls and skeletons of a Beaver and a Marmot. These external peculiarities, coupled with those of the digestive, excretory, and generative organs, certainly show that the *Castoridæ* is a very isolated and aberrant family; but they do not appear to indicate any specially murine affinities.

Fig. 2.



Mandible of *Cricetomys gambianus.*

An interesting confirmation of these views as to the position of the Beaver is afforded by the fossil rodent of the American Miocene, to which Professor Leidy has given the name of *Ischyromys*. In this form the dentition of the typical *Sciuridæ* is combined with a form of skull which very closely resembles that of the *Castoridæ*, and especially that of the Miocene genus *Stenofiber*. It differs from both these groups, however, in the possession of a large infra-orbital opening, and should form, as it appears to me, a fifth family of the *Sciuromorpha*, under the name of *Ischyromyidæ*†.

The second section, *Myomorpha*, is at once separated from either of the others by the single character of the complete fusion in the adult of the lower part of the tibia and fibula. Externally, the muffle and upper lip are as in the last section; and the tail is cylindrical, either covered with scales arranged in rings, or more or less hairy. The *Myomorpha* contains such a variety of forms, many of them much specialized, that it is only by allowing for exceptions that its definition can be carried further; still many and important distinctions are common to the vast majority. The form of the mandible, by which the section was first separated from the *Hystricomorpha*, agrees with the last section, the angular portion springing from the *lower* edge of the bony covering of the lower incisor, excepting in the subfamily *Bathyerginæ*, in which it has exactly the form so characteristic of the hystricine rodents. The other cranial characters are very varied. In the more typical forms the infraorbital opening has a peculiar shape, which may be termed *murine*; it is high, perpendicular, narrow, wider above than below; and the lower root of the maxillary zygomatic process is perpendicular and flattened into a thin plate with a rounded anterior edge. The zygoma is comparatively slender; the malar seldom advances far forward (except in the *Dipodidæ*), and is usually supported below by a continuation backwards of the maxillary process, being reduced in some of the typical genera to a mere splint between the latter and the squamosal process. The outer walls of the pterygoid fossæ are generally obsolete; and they have no direct fissure at the bottom, except in the aberrant subfamily named above. The clavicles are perfect except in the *Lophiomyidæ*.

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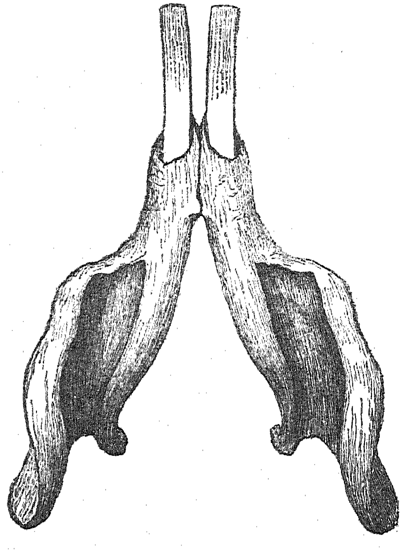
* *Op. cit.* pp. 7, 35.

† *Cf.* Leidy, Journ. Acad. Philadelphia, 2nd ser. vol. vii. pp. 335–338, pl. xxvi.; Cope, Report U.S. Geol. Survey, 1873, p. 477.

Fig. 3.



Mandible of *Bathyergus maritimus*.

Of the seven well-marked families into which this section may be divided, the typical one, the *Muridæ*, comprises a great number of genera. The best classification of these with which I am acquainted is that of Dr. Peters, which is here adopted with some little modification, his groups being ranked as subfamilies, and a slight alteration being made in their arrangement[*]. M. A. Milne-Edwards having clearly proved that the genera *Ellobius* and *Siphneus* really belong to this family[†], the subfamily *Siphneinæ* is now placed alongside of the *Arvicolinæ*, with which it is so nearly allied.

Of the other families, the *Myoxidæ* bear a very strong outward resemblance to the *Sciuromorpha*, which, however, is not markedly confirmed by their anatomy. Dr. Peters having shown that *Platacanthomys* must be removed to the *Muridæ*[‡], the remaining genera of Dormice are all very closely allied, and are isolated from all other known rodents by the complete absence of the cæcum. The next family, *Lophiomyidæ*, contains a single form differing in structure not only from all the rest of the order, but even from all the known members of the mammalian class[§]. Nevertheless, if the extraordinary development of the temporal and malar regions be overlooked, the whole skull of *Lophiomys* is truly murine in type; and this is confirmed by all the other more important points in its anatomy. It is strange that, although its habits appear to be at least partly arboreal, *Lophiomys* should differ from all the rest of the section in the incomplete development of its clavicles.

The *Spalacidæ*, even when disencumbered by the removal of *Siphneus* and *Ellobius*, are still divisible into two subfamilies—the typical *Spalacinæ*, which have the normal mandible of the section, and the *Bathyerginæ*, in which are found the hystricine characters already mentioned (*suprà* p. 68), and which were hence named *Spalaces subhystriciformes* by Prof. Brandt. The next family, which includes the American rodents with cheek-pouches which open *outside* the mouth, was founded by Mr. Waterhouse under the name of *Saccomyidæ*, and subsequently divided by Prof. Baird into two subfamilies, *Geomyinæ* and *Saccomyinæ*. Dr. E. Coues, in a recent valuable memoir, has contended that these latter divisions should rank as separate though allied families[‖]—a view in which I cannot agree. The diversity in their outward form may be paralleled by that in the Squirrels and Marmots; and the differences in their cranial structure are, as Dr. Coues himself observes, of a superficial nature. In any case, Mr. Waterhouse's name must be changed; for Dr. Peters has shown[¶] that the genus *Saccomys* of Frederic Cuvier is in all probability, a synonym of Desmarest's *Heteromys*. The oldest and best-known genus will therefore legitimately give name to the family *Geomyidæ*, the subfamilies standing as *Geomyinæ* and *Heteromyinæ*.

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[*] The names only of these divisions appeared in the Monatsb. Ak. Berlin, 1866, pp. 13, 14.; for access to Dr. Peters's hitherto unpublished characters I am indebted to the courtesy of the author.

[†] Recherches pour servir à l'Hist. Nat. des Mammifères, pp. 71–129.

[‡] P. Z. S. 1865, pp. 397–399.

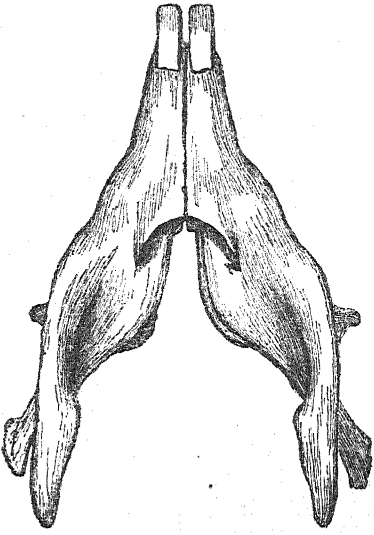
[§] *Cf.* A. Milne-Edwards, Nouv. Arch. du Mus. iii. pp. 81–118.

[‖] Rep. Explor. Colorado River, p. 215; Bull. U.S. Survey of Territories 2nd ser. no. 2, pp. 81–90.

[¶] Monatsb. Ak. Berlin, 1874, p. 354–359.

Here I am inclined to place, at least provisionally, a family of Rodents which flourished in Europe in the later Eocene and Miocene periods, and of which three genera are known. Each of these was at first ascribed to a distinct family of the *Hystricomorpha*—namely, *Theridomys* to the *Octodontidæ*, *Archæomys* to the *Chinchillidæ*, and *Issiodoromys* to the *Caviidæ*. M. Gervais was the first to remove them entirely from that section, uniting the first two in his tribe *Théridomins* of the family *Myoxidés* (which also included *Anomalurus*). He placed *Issiodoromys* in his *tribu des Pédétins* of the *Dipodidæ*, but with the remark that it might have to be relegated to the *Théridomins**. That these animals were strictly myomorphine is clearly shown by the form of their mandibles. Now that *Anomalurus* has been definitely separated from the *Myoxidæ*, there seems to be nothing to unite these ancient rodents with that family; and, both in their very varied dentition and in what we know of their cranial characters, they appear to me to be very nearly related to the *Dipodidæ*—the two former to the true *Dipodinæ*, and the last to the *Pedetinæ*. Meantime it may be best to allow them to stand as a distinct family under the name of *Theridomyidæ*.

Fig. 4.



Mandible of *Capromys pilorides*.

The last family of the *Myomorpha*, the *Dipodidæ*, is divisible into three plainly marked subfamilies—*Jaculinæ*, *Dipodinæ*, and

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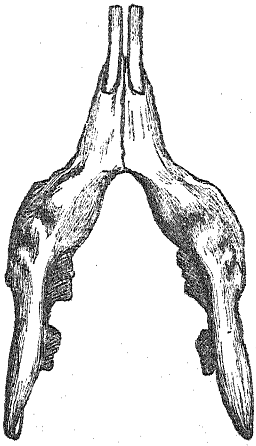
* Zool. et Paléont. Franç. (2me ed.). pp. 31-36.

Pedetinæ, of which the first is the most murine, and the second the most highly specialized, while the third shows more than superficial resemblances to the *Chinchillidæ*.

The third section, *Hystricomorpha*, is characterized by the form of the mandible, combined with persistence of the fibula as a distinct bone throughout life. In the mandible the ascending ramus and coronoid process are low, and the angular portion does not spring from the lower edge of the bony covering of the lower incisor. In the great majority of forms in which that tooth is long, the angular portion springs from the outer side of its bony sheath, so that when viewed from below there is a longitudinal groove between the angular and dental portions. In the *Caviidæ*, in which the incisors are short, "the direction of the incisor is such that, were it prolonged backwards, the alveolus of the tooth and the angular portion of the jaw would hold the same relative positions" as in the other members of the section*. This difference in the form of jaw will be best understood by a comparison of figures 4 and 5. In the skull the infraorbital opening is always large, oval or subtriangular, an interpterygoid fissure is present, and the foramina of the base of the skull are proportionally large, while the incisive foramina are small. The frontals have no distinct postorbital processes (except in *Chætomys*); and the malar, which is rarely continued far forward, is not supported below by a continuation of the maxillary zygomatic process. The clavicles are either perfect or imperfect; and one premolar is present above and below (except in *Ctenodactylus*). The upper lip is rarely cleft, the muffle is usually clad with very fine hairs, and the

Fig. 5.



Mandible of *Cavia aperea*.

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* Waterhouse, Nat. Hist. Mamm. ii. p. 149.

nostrils pointed above, sigmoid or linear. The ears are very generally emarginate behind; and the tail, when present, is cylindrical, hairy, scaly, or subnaked.

In the division of the hystricine Rodents into families much diversity of opinion has prevailed. Mr. Waterhouse, laying too great stress on dental characters, entirely separated the *Dasyproctina* from the *Caviina*, and placed them between the *Hystricina* proper and the *Echimyina*[*]. Prof. Brandt reunited the two former in his family *Hemionychoides*, equivalent to the *Subungulata* of Illiger[†]. But the group thus formed is so ill defined that Prof. Lilljeborg found it impossible to separate it from the *Hystricidæ*[‡]. It seems to me that, although Mr. Waterhouse was certainly misled in entirely separating the Agoutis and Pacas from the Cavies and Capybara, they must still be ranked as distinct but allied families, and that the same value must be given to the curious form named *Dinomys* by Dr. Peters[§]. Accordingly I would recognize six families of the *Hystricomorpha*.

Of these the first, the *Octodontidæ*, consists of three subfamilies; for here, I think, must be placed the *Ctenodactylinæ*, formerly associated with the Jerboas, but of which the hystricine affinities have been established by Dr. Peters[‖]. The other subfamilies are the *Octodontinæ* and *Echinomyinæ* of Mr. Waterhouse. Some of the genera of the latter make a close approach to the next family, the *Hystricidæ*, which in its turn is composed of two very distinct subfamilies, *Sphingurinæ* and *Hystricinæ*; for I cannot follow Professor Lilljeborg in relegating the former to the *Octodontidæ*[¶], principally on account of their better-developed clavicles, which are probably an adaptive peculiarity connected with their arboreal habits. Of the remaining families the *Chinchillidæ* form a small but very natural group, connected in some characters with the *Dinomyidæ*; and the latter, again, has close affinities with the nearly allied *Dasyproctidæ* and *Caviidæ*. These latter families in many points, as in the mode in which their incisors wear down, their emarginated palates, and the large size of their basicranial foramina, show a striking approach to the next great group of Rodents.

The second suborder, GLIRES DUPLICIDENTATI, containing only two families, is clearly less specialized than the first, and appears to be a survivor, representing a comparatively early stage in the development of the Rodent type. At birth, the upper jaw contains the normal number of incisors; but only the two inner pairs are retained; and of these the second remain very small, and are placed directly behind the large middle pair. In the mandible there is never more than one pair. Another important proof of the inferior degree of specialization in the *Glires duplicidentati* is the fact that the enamel of the incisors may be traced round to their posterior surface, though it is here much thinner than in front[**]. Of cranial characters, it may be noted that they have no true alisphenoid canal, but a carotid canal is present in the tympanic*. The optic foramina are confluent; and the bony palate is reduced to a mere bridge between the molar series, being bounded in front by the large confluent incisive foramina, and behind by the deep posterior emargination. The fibula is ankylosed below with the tibia, and articulates with the calcaneum. There are no vesicular glands; and the testes are permanently external.

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[*] Nat. Hist. Mamm. ii. p. 360.

[†] Prod. Syst. Mamm. p. 92.

[‡] *Op. cit.* p. 54.

[§] Festschrift. Gesellsch. nat. Freunde, pp. 227–234 (1873).

[‖] Tr. Z.S. vii. pp. 397–409.

[¶] *Op. cit.* p. 51.

[**] *Cf.* Owen, Comp. Anat. Vert. iii. p. 296.

The two families *Leporidæ* and *Lagomyidæ* are certainly very nearly allied, but differ in several important characters; and I have therefore followed Professor Lilljeborg in keeping them distinct. The absence of postorbital frontal processes, the posterior continuation of the zygoma towards the auditory meatus, the absence of reticulation in the facial portion of the maxillary, and the full development of the clavicles in the Pikas are among the points in which their anatomy confirms their distinction from the Hares, outwardly indicated by the different proportion of their ears and tails.

The remark has been made above that palæontology has hitherto not yielded much of interest to the student of this order. A striking exception, however, is to be found in certain wonderful forms from the South-American Miocene and Pliocene, of which the true position has been much disputed. Of these the most striking is the huge animal whose skull, discovered by Mr. Darwin, was described by Professor Owen under the name of *Toxodon*†, and since more fully investigated by Dr. Burmeister‡. Its Ungulate characters, however, much overweigh in importance those which it has in common with the Rodents; and it may therefore be dismissed from present consideration.

Another animal presenting an extraordinary combination of characters is that discovered by M. Bravard, and placed by him, under the name of *Typotherium*, among the Pachydermata§. Almost every part of its skeleton has been obtained; and the whole has been well described by M. Serres‖ under the name of *Mesotherium*, and by Professor Gervais¶ under Bravard's name**. The last-named zoologist considers that it must be regarded as a link between the Rodents and the Perissodactyles, and that its nearest affinities are with the *Leporidæ*.

The most important characters in which *Mesotherium* differs from existing Rodents are, briefly, the transversely hollowed crowns of the incisors (which have not the chisel-edge so characteristic of the order), their number in the lower jaw (as in *Hyrax*), the curvature of the molars, of which the convexity is not inwards but outwards (as in *Toxodon*), the transverse form of the condyle of the mandible and the glenoid fossa, and the articulation of the ischia with some of the caudal vertebræ (as in some Edentates). With regard to the first of these characters, we have seen that the enamel is present, though very thin, on the back as well as the front of the incisors of the *Glires duplicidentati*; and a side view of these teeth in the Hares and in some of the lower *Hystricomorpha* shows a sort of gradation between the acute edge of the more highly specialized forms and the hollowed crown of *Mesotherium*. Of the condyle and glenoid cavity also it is to be noted that, although they are not transverse in any existing Rodent, yet their shape is much less clearly defined in the less-specialized forms. In other respects the whole skeleton of *Mesotherium* presents so many resemblances to the Rodents that it seems to me that we must follow Professor Gervais in placing it in that order rather than in any other. Its affinities with the more aberrant Ungulates, and especially with *Toxodon*, cannot, however, be overlooked; and it appears to have been a survivor, to Pliocene times, of a much earlier type, which represented an era at which the Rodents were not yet clearly marked off from their allies*. In fact *Mesotherium* seems to continue *into* the order *Glires* that line of affinity which Prof. Flower has pointed out as extending from the typical Ungulates through *Hyracodon*, *Homalodontotherium*, *Nesodon*, and *Toxodon*†.

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* *Cf.* Turner, P. Z. S. 1848, p. 65.

† Zoology of the 'Beagle,' pt. 1, pp. 16–35.

‡ Ann. Mus. Pub. de Buenos Aires, i. pp. 254–286.

§ Catalogue des espèces d'anim. foss. recueillis dans l'Amér. du Sud, 4to. Parana, 1860.

‖ Comp. Rend. Ac. Paris, xliv. p. 961 (1857); lxv. pp. 6, 17, 140–148, 273–279, 429–437, 593–599, 740–748, 841–848.

¶ Zool. et Paléont. Générales, pp. 134–137, pls. xxii.–xxv.

** M. Gervais regards Bravard's name as having priority; on what grounds I cannot discover. It does not appear whether or not it was used in the latter writer's paper on the Geology of La Plata, published in the 'Registro Estadístico' of Buenos Ayres in 1857 (which M. Gervais was unable to find in Paris, and which is not in the British Museum); but even if it was it would only be contemporary with M. Serres's very appropriate name.

As to the affinities of *Mesotherium* within the Order *Glires*, they do not appear so exclusively leporine to me as to M. Gervais. While agreeing with the Hares in many important points, as in the form of the mandible (which, however, is still more like that of *Hyrax*), in that of the brain, as indicated by a cast of the cranial cavity, and in the articulation of the fibula with the calcaneum, *Mesotherium* rather inclines in other particulars to the *Glires simplicidentati*, and especially to *Hydrochœrus*. Among these may be enumerated the comparative shortness of the incisors, the smallness of the incisive foramina, the development of the bony palate and of the paroccipital processes, the depth of the malar, the form of the scapula, &c. Some at least of the toes seem to have been subungulate; and the terminal phalanx figured by Gervais (pl. xxv. fig. 34) very closely resembles the same bone in the Capybara.

As *Mesotherium* thus appears to present relationships to each of the existing suborders, combined with peculiarities which forbid its admission into either, I venture to propose the establishment of a third for its reception. It might be named GLIRES HEBETIDENTATI‡, and characterized by the incisors being two above and four below, the molars curved inwards and the condyles placed transversely.

Before ending this paper, with a Table of the characters of the various divisions here adopted, attention may be drawn to the accompanying chart (Plate IV.), on which I have endeavoured to indicate approximately the relationship of the different families to one another.

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* We have seen that in Europe the Rodents were fully differentiated in the Eocene period (*anteà*, p. 70).

† Phil. Trans. 1874. p. 181.

‡ *Hebes -tis*, blunt; *dentatus*, toothed.

Arrangement.

Order GLIRES.

Suborder I. GLIRES SIMPLICIDENTATI.
Sec. 1. *Sciuromorpha.*
Fam. 1. Anomaluridæ.
,, 2. Sciuridæ.
,, 3. Ischyromyidæ.
,, 4. Haplodontidæ.
,, 5. Castoridæ.
Sec. 2. *Myomorpha.*
Fam. 1. Myoxidæ.
,, 2. Lophiomyidæ.
,, 3. Muridæ.
,, 4. Spalacidæ.
“ 5. Geomyidæ.
,, 6. Theridomyidæ.
,, 7. Dipodidæ.
Sec. 3. *Hystricomorpha.*
Fam. 1. Octodontidæ.
,, 2. Hystricidæ.
,, 3. Chinchillidæ.
,, 4. Dasyproctidæ.
,, 5. Dinomyidæ.
,, 6. Caviidæ.

Suborder II. GLIRES DUPLICIDENTATI.
Fam. 1. Lagomyidæ.
,, 2. Leporidæ.

Suborder III. GLIRES HEBETIDENTATI.
Fam. 1. Mesotheriidæ.

Table of Characters.

Order GLIRES.

The middle pair of incisors long, curved, rootless, and constantly growing, their points more or less chisel-edged (except in *Mesotherium*), the other pairs very small or absent; no canines, a large space intervening between the incisors and the grinding-teeth, which are variously formed; premolars present or absent; three molars above and below (except in *Hydromys*). Skull with the temporal fossæ continuous with the orbits, within which the lachrymal foramen opens; an interparietal almost always distinct; the periotic and tympanic ankylosed to one another, but not to any other bone; and the auditory bullæ moderately or largely developed. Scapula narrow with a deep notch, a well-developed more or less bifurcated acromion, and a small coracoid. Clavicles perfect or imperfect. Scaphoid and lunar usually combined. Manus with five or four digits. Tibia and fibula either separate or ankylosed below. Pes with five, four, or three digits. Intestinal canal long; cæcum large (except in *Myoxidæ*). Liver with a bifid Spigelian lobe (except in *Anomalurus*). Placenta deciduate and discoidal.

Suborder I. GLIRES SIMPLICIDENTATI.

Incisors $\frac{2}{2}$ only, even at birth, their enamel confined to the front surface. Skull with both a true alisphenoid and an external alisphenoid canal*; optic foramina rarely confluent; incisive foramina separate; and bony palate well developed. Fibula either ankylosed with the tibia below or free, not articulating with the calcaneum. Testes abdominal, descending periodically; vesicular glands present*.

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* *Cf.* H. N. Turner, P. Z. S. 1848, p. 65.

Section I. *Sciuromorpha.*

Premolars present; when there is more than one in the upper jaw the first is smaller than the others; grinding-teeth rooted or rootless. Postorbital frontal processes present or absent, infraorbital opening various. Zygomatic arch mainly composed of the malar, which is not supported below by a continuation of the maxillary zygomatic process. Outer walls of pterygoid fossæ obsolete; no interpterygoid fissure. Incisive foramina small or moderate, not extending into the maxillaries. Mandible with the angular portion springing from the lower edge of the bony covering of the lower incisor, its outline more or less rounded, not pointed; coronoid process high and falcate. Clavicles perfect. Fibula persistent as a distinct bone through life, and usually perfectly free. Upper lip usually cleft, muffle small and naked; nostrils comma-shaped, rounded above. Tail cylindrical and hairy (except in *Castoridæ*). Five families:—

Family I. ANOMALURIDÆ.

One premolar above and below; grinding-teeth subequal, not tuberculate, with flat crowns and transverse enamel loops. Skull with postorbital processes obsolete; infraorbital opening large, subovate; palate contracted in front, deeply emarginate behind. Sixteen pairs of ribs. Limbs connected by a flying expansion of the skin, supported by a chondrified fascia articulating with the olecranon. Tail long, hairy, with a series of large scales on the lower basal portion. Distribution Ethiopian. Recent genus:—

Anomalurus, Waterhouse, P. Z. S. 1842, p. 124 . . . (1842).

(Characters those of the family.)

Family II. SCIURIDÆ.

Two premolars above, and one below; the first upper premolar very small, sometimes deciduous; grinding-teeth rooted, tubercular (at least in youth). Skull with distinct postorbital processes; infraorbital opening small, usually placed in front of the maxillary zygomatic process; palate broad, flat. Twelve or thirteen pairs of ribs. Tail cylindrical, hairy. Two subfamilies:—

A. SCIURINÆ. Incisors compressed. Limbs either free or united (*Pteromys*) by an expansion, whose fascia articulates with the carpus. Form slender, tail long. Cosmopolitan (exc. Australasian region). Recent genera:—

1. *Pteromys*, G. Cuvier, Leçons d'Anatomie . . . . . (1800).

Limbs united by a flying expansion, the supporting fascia of which articulates with the carpus; tail long, bushy. Grinders usually soon ground flat, in some tuberculate through life.

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* *Cf.* Owen, Comp. Anat. Vert. iii. p. 649.

2. *Sciurus*, Linnæus, Syst. Nat. i. p. 86 . . . . (1766).

Limbs free, form agile, tail long, bushy. No cheek-pouches; three or four pairs of teats. First upper premolar sometimes soon lost. Frontals ankylosed with parietals; postorbital processes moderate; infraorbital opening in front of anterior root of zygoma. Palate broad, flat.

3. *Xerus*, Hemprich & Ehrenberg, Symbol. Phys., Mamm. i., *gg* (1832).

Ears very short or rudimentary, tail short, fur sparse, harsh, with flattened spines. No cheek-pouches, two pairs of teats. Nasals and palate narrower, and postorbital processes much smaller than in *Sciurus*.

4. *Tamias*, Illiger, Prod. Syst. Mamm. p. 83 . . . . . (1811).

Ears short, fore feet with the fourth digit longest, limbs subequal, tail short. Large internal cheek-pouches. First upper premolar soon lost. Skull slender; infraorbital opening in anterior root of zygoma, not in front of it.

B. Arctomyinæ. Incisors not compressed. Limbs free, form usually stout, tail short. Palæarctic and Nearctic. Recent genera:—

5. *Spermophilus*, F. Cuvier, Mém. du Mus. vi. p. 293 . (1822).

Form somewhat slender; tail short or moderate. Claw of pollex rudimentary or absent. Large cheek-pouches. Series of grinding-teeth nearly parallel. Skull with no marked ridges; postorbital processes slender, directed backwards.

6. *Cynomys*, Rafinesque, Amer. Monthly Mag. ii. p. 45 (1817).

Form thickset, tail short, claws of fore feet long on all the digits, shallow cheek-pouches. Series of grinding-teeth strongly convergent behind. Skull short and broad; postorbital processes long, directed backwards; parietals narrow, parallelogrammatic.

7. *Arctomys*. Schreber, Säugethiere, iv. p. 721 . . . . . (1792).

Form thickset, tail short; pollex rudimentary, with a flat nail. Cheek-pouches rudimentary or absent. Series of grinding-teeth nearly parallel. Skull broad; postorbital processes large, triangular, standing out at right angles; parietals narrow, parallelogrammatic.

Fossil genera. The following genera, characterized from details of dentition, seem to be referable to this family:—*Plesarctomys*, Bravard, in Gervais's 'Zool. et Pal. Franç.' pl. xlvi. (1852), Eocene of France; *Pseudosciurus*, Hensel, Z. Deutsch. geol. Ges. 1856, p. 660, bone-beds of Württemberg; *Sciuravus*, Marsh, Am. Journ. Sc. 1871, p. 120, Eocene of North America; *Paramys*, Leidy, Geol. Survey, Montana, 1871, p. 363 (perhaps the same as the last); *Gymnotrichus*, Cope, Pal. Bulletin, i. p. 6 (1874), Miocene of North America.

Family III. ISCHYROMYIDÆ (fam. nov.)*.

Dentition as in *Sciuridæ*. Skull resembling *Castoridæ*, but with the infraorbital opening large, a sagittal crest, no postorbital processes, palate broad, basioccipital keeled. Miocene of North America. Fossil genus:—

Ischyromys, Leidy, Proc. Acad. Philad. 1856, p. 89 . . (1856).

(Characters those of the family.)

Family IV. HAPLODONTIDÆ.

Two premolars above and one below, the first upper premolar small; grinding-teeth rootless, simple, and prismatic. Skull much depressed, no postorbital processes, infraorbital opening small, angular portion of mandible much twisted. Tail short, cylindrical, hairy. Nearctic. Recent genus:—

Haplodon = *Aplodontia*, Richardson, Zool. Journ. iv. p. 334 (1829).

(Characters those of the family.)

Family V. CASTORIDÆ.

One premolar above and below; grinding-teeth subequal, semi-rooted or rootless, with reentering enamel-folds. Skull massive, no postorbital processes, infraorbital opening small and placed low, a sagittal crest, angle of mandible rounded. Carpus with a large accessory ossicle. Stomach with a glandular appendage, excretory and generative organs opening into a common cloaca. Tail broad, flattened, spatulate and reticulated. Hind feet fully webbed. Palæarctic and Nearctic. Recent genus:—

1. *Castor*, Linnæus, Syst. Nat. i. p. 78 . . . . (1766).

(External characters those of the family.) Upper grinding-teeth subequal, each with one internal and three external enamel-folds; the lower similar but reversed; the subsidiary folds not soon isolated from the exterior. Parietals narrow, parallelogrammatic; interparietal triangular; basioccipital concave.

Fossil genera:—

2. *Diobroticus*, Pomel, Arch. Bibl. Univ. Genève, ix. p. 167†. (1848).

Skull much as in *Castor*. Third upper molar and lower premolar elongate, with four enamel folds, the rest with only two; all the folds soon isolated.

3. *Stenofiber*, Is. Geoffroy, Revue Encyclopédique. . . . (1833).

Parietals not parallelogrammatic; interparietal subhexagonal; basioccipital not concave. Grinding-teeth as in *Castor*, the subsidiary folds sooner isolated.

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* It seems probable that *Pseudotomys*, Cope, Proc. Am. Phil. Soc. 1872, p. 467, from Eocene of North America, may prove to belong to this family.

† = *Trogontherium* Owen (nec Fischer), Brit. Foss. Mamm. p. 184; Geol. Mag. vi. pp. 49–56 (cf. Gervais, Zool. et Paléont. Générales, pp. 80–84).

4. *Castoroides*, J. W. Forster, 2nd Rep. Geol. Ohio, p. 81 (1838).

Parietals not parallelogrammatic; interparietal very small; basioccipital concave. Incisors with numerous longitudinal grooves; grinding-teeth with the enamel-folds extending quite across their crowns, completely separated and united only by cement; the last upper molar and lower premolar with four folds, the rest with three only.

More doubtful fossil genera are:—*Trogontherium*, Fischer, Mém. Soc. Imp. Nat. Mosc. ii. p. 260 (1809); *Palæomys*, Kaup, Isis, 1832, p. 992; *Chalicomys*, Kaup, *op. cit.* p. 994; *Chelodus*, Kaup, *op. cit.* p. 995; *Palæocaster*, Leidy, Journ. Ac. Philad. vii. p. 338 (1869).

Section II. *Myomorpha.*

Premolars present or absent; grinding-teeth rooted or rootless. No postorbital frontal processes; infraorbital opening various. Zygomatic arch slender; the malar rarely extending far forward, and being usually supported below by a continuation of the maxillary zygomatic process. Incisive foramina usually long, and extending into the maxillaries. Outer walls of pterygoid fossæ often obsolete, no interpterygoid fissure (except in *Bathyerginæ*). Angular portion of mandible springing from the lower edge of the bony covering of the lower incisor (except in *Bathyerginæ*). Clavicles perfect (except in *Lophiomyidæ*). Tibia and fibula completely ankylosed in the adult for at least their lower third. Upper lip usually cleft; muffle small and naked; nostrils comma-shaped, rounded above. Tail cylindrical, either hairy or covered with scales arranged in rings. Seven families:—

Family I. MYOXIDÆ.

One premolar above and below, which is rather smaller than the molars; all the grinding-teeth rooted, with transverse enamel-folds. Skull with frontals much contracted, clasped by the parietals; interparietal broad, articulating with the squamosals. Infraorbital opening moderate, high, narrow. Mandible with the angle rounded or subquadrate, coronoid long and slender. No cæcum. Form gracile; eyes and ears large; fore limbs small; tail long, hairy. Palæarctic and Ethiopian. Recent genera:—

1. *Myoxus*, Schreber, Säugeth. iv. p. 824 . . . . (1792).

Tail bushy and distichous throughout. Stomach simple. Angular portion of mandible not perforate. Premolars small; molars large, with well-marked enamel-folds.

2. *Muscardinus*, Kaup, Entw. europ. Thierw. p. 139 . . (1829).

Tail bushy and cylindrical throughout. Stomach complicated. Mandible not perforate. Grinding-teeth large; their crown flat, with well-marked and numerous folds.

3. *Eliomys*, Wagner, Abhand. baierisch. Akad. iii. p. 179 (1843).

Tail with short hairs at base, tufted and distichous towards its end. Stomach simple. Angular portion of the mandible perforate. Grinding-teeth smaller; their crowns concave, with few and faintly marked folds.

4. *Graphiurus*, F. Cuvier & Geoffroy, Mammifères, 60^{me} livr. (1845).

Tail short, cylindrical, ending in a pencil. Mandible not perforate. Grinding-teeth very small; their crowns flat, with hardly a trace of enamel-folds.

Family II. LOPHIOMYIDÆ.

No premolars; molars rooted and tuberculate. Skull as in the typical *Muridæ*, but with the temporal fossæ completely arched over by thin plates developed from the temporal ridge and the malar, articulated with one another; surface of skull granulated. Clavicles imperfect. Cæcum small. Form thickset. Hair long, forming a crest along the back and tail. Ethiopian. Recent genus:—

Lophiomys, A. Milne-Edwards, L'Institut, xxxv. p. 46 . (1867).

(Characters those of the family.)

Family III. MURIDÆ.

Lower incisors compressed; no premolars (except in *Sminthinæ*); molars rooted or rootless, tuberculate or with angular enamel-folds. Frontals contracted. Infraorbital opening in typical forms high, perpendicular, wide above and narrowed below, with the lower root of the maxillary zygomatic process more or less flattened into a perpendicular plate; very rarely the opening is either large and oval or small and subtriangular. Malar short and slender, generally reduced to a splint between the maxillary and squamosal processes. External characters very variable. Pollex rudimentary, but often with a small nail. Tail generally subnaked and scaly, rarely densely haired. Cosmopolitan. Ten subfamilies*:—

(*a* Molars rooted.)

A. SMINTHINÆ. Premolars $\frac{1}{1}$, molars $\frac{3}{3}$. Infraorbital opening subtriangular, widest below. Incisive foramina long. Palæarctic. Recent genus:—

1. *Sminthus*, Keyserling & Blasius, Wirbelth. Europ. p. 38 (1840).

(Characters those of the subfamily.)

B. HYDROMYINÆ. Molars $\frac{2}{2}$, divided into transverse lobes. Infraorbital opening crescentic, scarcely narrowed below. Incisive foramina and auditory bullæ very small. Hind feet partly webbed. Australasian. Recent genus:—

2. *Hydromys*, Geoffroy, Ann. du Mus. vi. p. 81 . . . . (1805).

(Characters those of the subfamily.)

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* *Suprà*, p. 69.

C. PLATACANTHOMYINÆ. Molars $\frac{3}{3}$, divided into transverse laminæ. Infraorbital opening typical; incisive foramina and auditory bullæ small. Form myoxine; fur mixed with flattened spines; tail densely haired. Indian. Recent genus:—

3. *Platacanthomys*, Blyth, Proc. As. Soc. Bengal, xxviii. p. 289 (1859).

(Characters those of the subfamily.)

D. GERBILLINÆ. Incisors narrow; molars divided into transverse laminæ. Infraorbital opening typical; pterygoid fossæ short; auditory bullæ usually large. Hind limbs elongated; tail long, hairy. Palæarctic, Indian, and Ethiopian. Recent genera:—

4. *Gerbillus*, Desmarest, Nouv. Dict. d'Hist. Nat. xxiv. p. 22 (1804).

Form murine; muzzle pointed; ears moderate, sparsely haired; tail long, hairy, slightly tufted. Skull with occipital region broad; auditory bullæ large. Incisors grooved or plain. First molar with three laminæ, the second with two, the third with one only.

5. *Mystromys*, Wagner, Wiegm. Arch. 1841, p. 132 . . (1841).

Ears large and broad; tail moderately long, truncated, not tufted. Auditory bullæ smaller. Incisors plain. First molar with three laminæ, the second and third with two each; these are alternated, and the last is very small.

6. *Otomys*, F. Cuvier, Dents des Mamm. p. 168 . . . . (1825).

Ears large, hairy; tail moderate, clad with scales and short hairs, not tufted. Nasal profile more arched than in *Gerbillus*. Incisors grooved. Molars with their laminæ completely separated and united by cement; the third the longest, with from three to seven laminæ.

7. *Dasymys*, Peters, Monatsb. Akad. Berlin, 1875, p. 12 (1875).

Ears moderate, hairy; fur somewhat coarse; tail moderate, scaly, and sparsely haired. Skull intermediate between *Gerbillus* and *Mus*. Lower branch of maxillary zygomatic process produced forward in a hook-shape. Incisors plain. Front molars the longest; the posterior lamina of the first and the anterior laminæ of the second and third upper molars large and complicated.

E. PHLŒOMYINÆ. Incisors broad; molars divided into transverse laminæ. Infraorbital opening typical. Claws large. Indian. Recent genera:—

8. *Phlœomys*, Waterhouse, P. Z. S. 1839, p. 108 . . . . (1839).

Muzzle blunt; lip imperfectly cleft; ears moderate, hairy externally; tail moderately long, densely haired. Skull ovate; frontals not contracted, with a rudimentary postorbital process at their junction with the squamosals; auditory bullæ very small. Incisors very broad. First upper molar with three laminæ; second and third with two; first lower with four, second with three, and third with two laminæ.

9. *Nesokia*, Gray, Ann. and Mag. Nat. Hist. x. p. 264 . (1842).

Muzzle blunt; ears moderate; claws long; fur rather harsh; tail short, scaly, sparsely haired. Palate narrow; incisive foramina short; auditory bullæ rather small. Incisors broad. First molars with three laminæ; the rest with two only.

F. Dendromyinæ. Incisors convex in front; molars tuberculate. Infraorbital opening not narrowed below; coronoid process very small. Ears hairy. Claws long. Ethiopian. Recent genera:—

10. *Dendromys*, A. Smith, S. African Q. Journ. ii. p. 158 (1834).

Form slender; tail long, scaly, and sparsely haired. Three middle digits of each foot much longer than the first and fifth. Incisors grooved. Molars parallel in series; the first as long as the second and third taken together; their tubercles arranged in pairs.

11. *Steatomys*, Peters, Reise n. Mossambique, i. p. 162 . (1852).

Form plump; tail rather short, finely scaled and densely haired; claws of fore feet the longest. Incisors grooved. Molars converging behind; the first longer than the second and third taken together; their tubercles arranged in twos and threes.

12. *Lophuromys*, Peters, Monatsb. Ak. Berlin, 1874, p. 234 (1874).

Form as in *Steatomys*, but fur developed into fine flattened bristles, pterygoid fossæ longer, and coronoid process better-developed. Incisors plain. Molars nearly parallel in series; the third upper with only two anterior tubercles.

G. Cricetinæ. Molars tuberculate. Infraorbital opening subtypical, not much narrowed below, and the perpendicular plate little developed. Large internal cheek-pouches. Palæarctic and Ethiopian. Recent genera:—

13. *Cricetus*, G. Cuvier, Règne Animal (1re éd.), i. p. 198 (1817).

Form thickset; limbs short; claws large; tail short, not scaly, sparsely haired. Cheek-pouches large. Skull with marked but rounded supraorbital ridges continued into temporal ridges; coronoid process high and falcate. Incisors plain. Molars with tubercles arranged in pairs, of which the first has three and the rest two only; these entirely disappear in aged specimens.

14. *Saccostomus*, Peters, Monatsb. Ak. Berl. 1846, p. 258 (1846).

Form as in *Cricetus*, but feet and claws weaker and more murine. Cheek-pouches moderate. Supraorbital ridges more parallel, and infraorbital opening more typically murine; incisive foramina longer. Incisors plain. Molars with tubercles arranged in threes, one of each row being smaller than the other two.

15. *Cricetomys*, Waterhouse, P. Z. S. 1840, p. 2 . . . . (1840).

Form more murine; muzzle pointed; tail long, scaly, and very sparsely haired. Cheek-pouches large. Skull most like that of *Saccostomus*, but incisive foramina much smaller. Upper incisors grooved. Molars as in *Saccostomus*.

H. Murinæ. Molars tuberculate, at least in youth. Infraorbital opening typical; pterygoid fossæ lengthened; auditory bullæ moderate. Cheek-pouches absent or very small. Tail scaly, more or less naked. Cosmopolitan. Recent genera:—

16. *Mus*, Linnæus, Syst. Nat. i. p. 79 . . . . (1766).

Muzzle pointed; eyes prominent; ears rather large, subnaked; fur soft (rarely mixed with spines); pollex rudimentary; claws short; tail moderate or long, scaly, with scattered hairs. No cheek-pouches. Skull elongate, narrow; temporal ridges nearly parallel; palate compressed; incisive foramina long; auditory bullæ moderately large; coronoid process high, falcate. Incisors rarely grooved. Molars with transverse ridges, each composed in youth of three tubercles.

17. *Pelomys*, Peters, Reise n. Mossambique, i. p. 157 . (1852).

Middle three digits of each foot longer than the first and third; fur bristly; tail short, scaly. Palate much compressed. Incisors grooved. Molars broader than in *Mus*.

18. *Echinothrix* (=*Echiothrix*), Gray, P. Z. S. 1867, p. 599 (1867).

Head elongate, muzzle produced; fur mixed with flattened spines; tail long, scaly. Facial portion of skull greatly elongated; nasals very narrow; palate much compressed; incisive foramina long; coronoid process small. Incisors grooved. First upper molars large, with three ridges, second with one only; third small, simple, subcircular.

19. *Uromys*, Peters, Monatsb. Ak. Berlin, 1867, p. 343 (1867).

External characters as in *Mus*; but the caudal scales thick, polygonal, and not overlapping, auditory bullæ and incisive foramina smaller, and pterygoid processes more like those of *Hapalotis*.

20. *Hapalotis*, Lichtenstein, Darst. neu. Säugeth. Th. iv. pl. 29 (1829).

Muzzle produced; ears long, tapered, sparsely haired outside; hind limbs elongated; fur soft; tail long, hairy, terminating in a pencil. Skull with no distinct occipital crest or supraorbital ridges; incisive foramina very large; coronoid process obsolete. Incisors plain. Molars as in *Mus*.

21. *Acomys*, Is. Geoffroy, Ann. Sc. Nat. 2^me^ sér. x. p. 126 (1840).

Fur mixed with flattened spines, especially on the head and back; tail short, scaly. Skull as in *Mus*, but the pterygoid fossæ more shallow, and the incisive foramina extremely small; coronoid process little developed. Teeth as in *Mus*.

22. *Nesomys*, Peters, Sitzungs-Ber. Gesell. nat. Freunde, 1870, p. 54 (1871).

Form murine; upper lip grooved, not cleft; ears and eyes large;

feet as in *Mus*; tail long, scaly. Skull as in *Mus*; the infraorbital foramen lower and wider. Incisors plain. Molars like those of *Hesperomys*; the first upper, when worn, with one internal and two external indenting folds; the first lower with one external and two internal, the rest with one external and one internal fold.

23. *Brachytarsomys*, Günther, P. Z. S. 1875, p. 79 . . (1875).

Upper lip grooved, not cleft; eyes small; ears short; hind feet much shorter than the lower leg; tail long, scaly. No supraorbital ridges; auditory bullæ moderate. Incisors plain. Molars with two or three indenting folds on each side, one of which in the upper molars passes quite across the crown.

24. *Drymomys*, Tschudi, Fauna Peruana, p. 178 . . (1844-6).

Form murine; muzzle pointed; upper lip cleft; ears large; tail long, scaly. Incisors furrowed on the sides. Molars small; the first with three pairs of tubercles, the second with two, the third with one pair only.

25. *Holochilus*, Brandt, Mém. Ac. St. Pétersb. (6me sér.) iii. p. 428 (1835).

Muzzle obtuse; upper lip not fully cleft; fore feet small; hind limbs large and strong; tail long, sparsely haired. Skull short, strong; supraorbital ridges well marked. Incisors broad, flat, plain. Molars large, the third as large as the second, with tubercles arranged in pairs, which soon wear away, leaving the crown flat with indenting folds.

26. *Hesperomys*, Waterhouse, Zool. Voy. Beagle, i. p. 75 (1839).

Upper lip cleft; ears large or moderate; tail sparsely haired. Small internal cheek-pouches in a few species. Skull murine, with or without marked supraorbital ridges. Incisors plain. Molars as in the last genus, but narrower; the third smaller than the second, and the first upper with three roots.

27. *Ochetodon*, Coues, Proc. Acad. Philad. 1874, p. 184 (1874).

As in the last genus; tail moderate. Upper incisors grooved. First upper molar with four roots.

28. *Reithrodon*, Waterhouse, P. Z. S. 1837, p. 29 . . . (1837).

Profile arched; eyes large; ears hairy; hind feet with first and fifth digits very short; tail moderate, hairy. Skull with nasal portion large, supraorbital ridges well marked, posterior nares narrowed by the approximation of the pterygoids. Upper incisors grooved. Molars as in *Hesperomys*, their indenting folds deep.

29. *Sigmodon*, Say & Ord, Journ. Acad. Philad. iv. p. 352 (1825).

Muzzle blunt; upper lip partially cleft; ears large, but nearly concealed in the long fur; hind feet with first and fifth digits very short; tail moderate, nearly naked. Skull with supraorbital ridges sharp, perpendicular plate of zygoma emarginate in front, incisive foramina large. Incisors plain. Molars never tuberculate, the indenting folds deep and closed, those of the second and third lower molars sigmoid.

30. *Neotoma*, Say & Ord, Journ. Acad. Philad. iv. p. 346 (1825).

Ears large, nearly naked; tail long, either sparsely haired or bushy. Upper incisors broad, plain. Molars never tuberculate, with open angular indenting folds, giving them a very arvicoline appearance.

(*β. Molars semirooted or rootless.*)

I. ARVICOLINÆ. Molars composed of triangular prisms placed alternately. Skull with brain-case rhomboidal, frontals much contracted, infraorbital opening typical. Limbs moderate; tail moderate or short, hairy. Palæarctic and Nearctic. Recent genera:—

31. *Fiber*, G. Cuvier, Leçons d'Anatomie . . . . (1800).

Form thickset; muzzle blunt; limbs short, subequal; hind feet fringed with long stiff hairs; tail moderate, compressed, clad with scales and short hairs; supraorbital ridges united in a sagittal crest. Palate and lower surface of maxillaries minutely perforated. Incisors plain. Molars semirooted, separated into prisms, which are placed alternately.

32. *Arvicola*, Lacépède, Tableau . . . . (1803).

Muzzle blunt; fore feet small, with short claws, soles naked; tail longer than the hind foot, clad with short hairs. Skull as in *Fiber*; but the supraorbital ridges diverge after meeting, and converge again on the interparietal; palate not perforated. Incisors plain. Molars as in *Fiber*, rootless (rarely semirooted).

33. *Myodes*, Pallas, Zoogr. Rosso-Asiat. i. p. 173 . . . (1811).

Muzzle blunt; fore feet moderate, with strong hooked claws; soles hairy; tail not longer than hind foot, hairy. Skull as in *Arvicola*, but the brain-case broader and the zygomatic arches stronger. Molars rootless, as in *Arvicola*, but the prisms of the posterior teeth usually compressed and twisted.

K. SIPHNEINÆ. Molars as in the *Arvicolinæ*; infraorbital opening small and subtriangular. Form cylindrical; ear-conch rudimentary; limbs and tail very short. Palæarctic. Recent genera:—

34. *Ellobius*, Fischer, Zoognosia, iii. p. 72 . . . . (1814).

Body subcylindrical; limbs very short, upper lip cleft; eyes small; no external ear-conch; fore feet with short claws, but stronger than the hind feet; tail very short. Skull as in *Arvicola*, but the profile more arched and the facial portion shorter. Upper incisors arched forward.

35. *Siphneus*, Brants, Het Geslact der Muizen, p. 20 . . (1827).

Eyes small; ears rudimentary; fore feet with long, strong claws, that of the fifth digit being longer than the toe itself; tail short, hairy. Skull broader and more truncated behind than in *Ellobius*; supraorbital ridges nearly parallel; occipital crest sharp; infraorbital foramen subtriangular. Upper incisors perpendicular.

Fossil genera. The following genera will probably prove to be referable to this family:—*Cricetodon*, Lartet, Notice, p. 20 (1851); *Eumys*, Leidy, Proc. Ac. Philad. 1856, p. 90; *Heliscomys*, Cope, New Vert. Colorado, p. 3 (1873), Miocene of North America; *Mysops*, Leidy, U.S. Geol. Surv. Terr. i. p. 111 (1873), Eocene of America.

Family IV. SPALACIDÆ.

Incisors large; premolars present or absent; grinding-teeth rooted, not tuberculate, with reentering enamel-folds. Infraorbital opening moderate or small, with no perpendicular plate; occipital plane high, often sloped boldly forward; palate narrow. Form cylindrical; eye and ear-conch very small, sometimes rudimentary; limbs short and stout; claws large; tail short or absent. Two subfamilies:—

A. SPALACINÆ. Palate between the molars broader than one of the alveoli. No interpterygoid fissure. Mandible of normal myomorphine form (the angular portion springing from *the edge* of the bony covering of the lower incisors). Palæarctic, Indian and Ethiopian. Recent genera:—

1. *Spalax*, Güldenstädt, Nov. Comment. Petrop. xiv. i. p. 409 (1770).

Head broad, flat, with a ridge of long stiff hairs on each side; eyes rudimentary, covered by the skin; no ear-conch or external tail; feet broad, claws short. Skull depressed, occipital plane high and sloped boldly forward; parietals and interparietal small and soon ankylosed; infraorbital opening moderate, suboval. Upper incisors plain, nearly perpendicular. No premolars. Molars with curved enamel-folds in youth only.

2. *Rhizomys*, Gray, P. Z. S. 1830, p. 95 . . . . (1830).

Form robust; eyes very small; ears very short, naked; pollex rudimentary; tail rather short, partially haired. Skull broad, occipital plane only slightly sloped forward; infraorbital opening small, subtriangular. Upper incisors arched forward. No premolar. Upper molars with one deep internal and two or more external enamel-folds; the lower molars reversed.

3. *Heterocephalus*, Rüppell, Mus. Senkenb. i. Säugeth. p. 99 (1834).

Eyes very small; no ear-conch; pollex short, not rudimentary; tail short; whole body almost hairless. Skull as in *Rhizomys*, but broader, occipital plane more perpendicular, and infraorbital foramen larger. Dentition similar, but the upper molars with an external indenting fold only, the lower with one external and one internal fold.

B. BATHYERGINÆ. Palate between the molars not broader than one of the alveoli; an interpterygoid fissure; mandible hystricine in form (the angular portion springing from *the side* of the bony covering of the lower incisor). Ethiopian. Recent genera:—

4. *Bathyergus*, Illiger, Prod. Syst. Mamm. p. 86 . . . (1811).

Eyes small; no ear-conch; fore feet with very long claws; hind feet with the third digit longest; tail short, hairy. Skull massive, occipital plane perpendicular; nasals very narrow; parietals very small; infraorbital foramen very small, subcircular; angle of mandible pointed. Upper incisors enormously large, broad, grooved. One premolar above and below. Molars with indenting enamel-folds in youth only.

5. *Georychus*, Illiger, Prod. Syst. Mamm. p. 87 . . . . (1811).

Externally like *Bathyergus*, but the claws, especially of the fore feet, shorter and weaker, skull with the profile more arched, the occipital plane slightly sloped forward, and the angle of the mandible rounded. Upper incisors long, arched forwards, plain. Grinding-teeth as in *Bathyergus*.

6. *Heliophobius*, Peters, Monatsb. Ak. Berlin, 1846, p. 239 (1846).

Differs externally from *Georychus* in the second digit of the hind feet being the longest. Skull with the infraorbital opening smaller, the bony palate shorter, and the coronoid process larger. Incisors plain. Three premolars above and below; but sometimes two only are developed.

Family V. GEOMYIDÆ.

One premolar above and below. Grinding-teeth rooted or rootless. Malar extending forward to the lachrymal. Squamosals extremely large. Angular portion of mandible strongly twisted. Large cheek-pouches, opening on the cheeks *outside* the mouth. Upper lip not cleft. Other external characters very variable. Nearctic and Neotropical. Two subfamilies:—

A. GEOMYINÆ. Incisors broad. Skull massive; infraorbital opening very small; mastoid not appearing on the top of the skull; malar stout. Form thickset; eyes small; ear-conch rudimentary; limbs short, subequal; fore claws very large. Recent genera:—

1. *Geomys*, Rafinesque, Am. Monthly Mag. ii. p. 45 . . (1817).

Fore feet large, with very large compressed curved claws; tip of tail naked; cheek-pouches large. Skull very massive; zygomatic arches stout. Upper incisors deeply grooved. Crowns of premolars divided into two subequal lobes.

2. *Thomomys*, Max. Prinz zu Wied, Nov. Act. Ac. Car. Leop. xix. i. p. 383 . . . . (1839).

Fore feet comparatively small, with moderate claws; cheek-pouches moderate. Skull less massive; zygoma more slender. Upper incisors plain, or with merely a fine groove near their inner edge. Anterior lobes of premolars small. A third upper molar small, subcircular.

B. Heteromyinæ. Incisors narrow. Skull more delicate, with the mastoid appearing largely on its top; infraorbital opening not defined, through the non-development of the lower root of the maxillary zygomatic process; malar slender. Cervical vertebræ sometimes ankylosed (as in *Dipodinæ*). Form slender; hind limbs and tail elongated; eye and ear moderate or large. Recent genera:—

3. *Dipodomys*, Gray, Ann. & Mag. Nat. Hist. vii. p. 521 (1840).

Ear large, rounded; tail long, densely haired, tufted; soles hairy; pollex very small, with a small claw. Cheek-pouches large. Skull with nasals produced in front; upper part of zygoma produced into a flat plate articulating with the frontals; interparietal very small, narrow; auditory bullæ enormous, projecting far beyond the occipital plane. Incisors plain. Grinding-teeth rootless, at first with slight indenting enamel-folds, afterwards simple.

4. *Perognathus*, Max. Prinz zu Wied, Nov. Act. Ac. Car. Leop. xix. i. p. 369 . . . . (1839).

Ears shorter; tail thinly haired; soles more or less naked; pollex with a flat nail. Skull less modified; nasals not so much produced; zygoma not developed into a flat plate; interparietal broad; auditory bullæ not projecting behind the occipital plane. Incisors grooved. Grinding-teeth rooted, tuberculate in youth, afterwards with isolated enamel-loops.

5. *Heteromys*, Desmarest, Mammalogie, p. 313. . . . . (1820).

Like *Perognathus*, but the fur bristly, mixed with flattened spines; tail shorter, clad with large scales and scattered hairs. Skull with sharp supraorbital ridges; interparietal very broad. Upper incisors plain. Grinding-teeth as in *Perognathus*.

Family VI. Theridomyidæ.

One premolar present above and below. Grinding-teeth rooted or rootless, not tuberculate, with more or fewer transverse enamel-folds. Infraorbital opening large, suboval. Palate somewhat contracted in front and emarginate behind. Eocene and Miocene of Europe. Fossil genera:—

1. *Theridomys*, Jourdan, Compt. Rend. Ac. Paris, v. p. 483 (1837).

Grinding-teeth rooted, with three or four reentering enamel-folds, which become isolated enamel-loops in the worn teeth.

2. *Archæomys*, De Laizer et De Parieu, C. R. Ac. Paris, viii. p. 206 (1839).

Grinding-teeth rootless, the enamel-folds continued diagonally across the crowns, which are thus divided into laminæ, of which the anterior is the largest above, while they are subequal below.

3. *Issidioromys* (Croizet), De Blainville, C. R. Ac. Paris, x. p. 932 (1840).

Grinding-teeth rootless, with open reentering folds dividing their crowns into heart-shaped lobes; the subsidiary folds only represented here and there by a minute isolated enamel-loop.

Family VII. DIPODIDÆ.

Incisors compressed. Premolars present or absent. Grinding-teeth rooted or rootless, not tuberculate, with more or fewer transverse enamel-folds. Skull with the brain-case short and broad; infraorbital opening rounded, very large (often as large as the orbit); zygomatic arch slender, curved downwards; the malar ascending in front to the lachrymal in a flattened perpendicular plate; facial surface of maxillaries minutely perforated; mastoid portion of auditory bullæ usually greatly developed. Metatarsal bones greatly elongated, often fused into a cannon bone. Form gracile; front portion of body and fore limbs very small; hind limbs long and strong, with from three to five digits; tail long, hairy. Three subfamilies:—

A. JACULINÆ*. One premolar above. Grinding-teeth rooted. Cervical vertebræ free, metatarsals separate. Hind feet with five developed digits. Tail sparsely haired. Nearctic. Recent genus:—

1. *Jaculus*, Wagner, Syst. Amph. &c. p. 23 . . . . (1830).

(Characters those of the subfamily).

B. DIPODINÆ. Premolars present or absent. Grinding-teeth rooted. Cervical vertebræ more or less ankylosed. Metatarsals united in a cannon-bone. Hind feet with only three digits functionally developed. Tail thickly haired, often tufted. Palæarctic and Ethiopian. Recent genera:—

2. *Dipus*, Gmelin, Syst. Nat. ed. 13, i. p. 157 . . . . . (1788).

Hind feet with three digits only; tail cylindrical, tufted. Skull with occipital region very broad, auditory bullæ enormously developed, infraorbital opening with a separate canal for the nerve. Incisors grooved. Premolars absent or almost rudimentary, and found above only.

3. *Alactaga*, F. Cuvier, P. Z. S. 1836, p. 141 . . . . . . (1836).

Hind feet with five digits, of which the first and fifth do not reach the ground; tail cylindrical, tufted. Skull with the occipital region less broad, auditory bullæ smaller, infraorbital opening with no separate canal for the nerve. Incisors plain. One very small premolar present above only.

4. *Platycercomys*, Brandt, Bull. Ac. St. Pétersb. p. 209 . (1844).

As in *Alactaga*, but the hind limbs proportionally shorter, and the tail flattened, lancet-shaped, covered with short hairs and not tufted. No premolars.

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* Since the above went to press, Dr. E. Coues has published a paper in which he rejects the generic names *Jaculus* and *Meriones* as preoccupied, substitutes *Zapus*, and regards the form as the type of a distinct family, *Zapodidæ* (Bull. U.S. Geol. Surv. v. pp. 253–262).

C. PEDETINÆ. One premolar above and below. Grinding-teeth rootless. Cervical vertebræ free. Metatarsals separate. Hind feet with four well-developed digits, with short broad hoof-like nails. Tail bushy throughout, not tufted. Ethiopian. Recent genus:—

5. *Pedetes*, Illiger, Prod. Syst. Mamm. p. 81. . . . . . (1811). (Characters those of the subfamily.)

Section III. *Hystricomorpha.*

One premolar above and below (except in *Ctenodactylus*). Grinding-teeth rooted or rootless, not tuberculate. Frontals with no distinct postorbital processes (except in *Chætomys*). Infraorbital opening large, subtriangular, or oval. Zygomatic arch proportionally stout; malar not advancing far forward (except in *Ctenodactylinæ* and *Chinchillidæ*), and not supported below by a continuation of the maxillary zygomatic process. Incisive foramina small; foramina in base of skull proportionally large; an interpterygoid fissure. Mandible with its angular portion springing from the *outer side* of the bony covering of the lower incisor, triangular, usually pointed behind; coronoid process small, and condyle low. Clavicles perfect or imperfect. Fibula persistent as a distinct bone throughout life. Upper lip rarely cleft. Muffle clad with fine hairs. Nostrils pointed above, sigmoid or linear. Ears usually emarginate behind. Tail hairy, subnaked, or scaly.

Family I. OCTODONTIDÆ.

Grinding-teeth with external and internal enamel-folds. Malar with an inferior angle; incisive foramina usually long, extending into the maxillaries; clavicles perfect. Both hind and fore feet usually with five digits, rarely with four; claws curved. Teats placed high on the flanks. Tail clad with short hairs or with scales. Three subfamilies:—

A. CTENODACTYLINÆ. Grinding-teeth semirooted. Malar extending to the lachrymal (as in the last family) in a flattened perpendicular plate. Hind feet with the claws of the two inner digits covered by comb-like series of bristles. Ethiopian. Recent genera:—

1. *Ctenodactylus*, Gray, Spicilegia Zoologica, p. 10 . . (1830). Ears very small, with no antitragus. Tail rudimentary. Interparietal and auditory bullæ large; coronoid process reduced to a ridge. No premolars. Molars with single external and internal enamel-folds.

2. *Pectinator*, Blyth, J. A. S. B. xxiv. p. 294 . . . . . (1855). Ears with a small antitragus. Tail half as long as the body, bushy. Interparietal smaller, auditory bullæ larger, and palate more contracted than in *Ctenodactylus*. Premolars present, but very small. Third upper molar with two external folds.

B. OCTODONTINÆ. Grinding-teeth semirooted or rootless, with short and simple enamel-folds. Fur soft. Tail usually short. Ethiopian and Neotropical. Recent genera :—

3. *Petromys*, A. Smith, S. African Quart. Journ. ii. p. 2 (1831).

Ears short. Fur rather harsh. Pollex very short, with a small nail. Claws short. Tail moderate, rather bushy. Infraorbital opening with a small groove for the nerve. Grinding-teeth semirooted, with single external and internal folds, which nearly meet in the middle.

4. *Ctenomys*, De Blainville, Bull. Soc. Philomath. 1826, p. 62 (1826).

Eye and ear very small. Fur soft. Claws longer than the toes, those of the hind feet with comblike bristles (as in *Ctenodactylinæ*). Tail rather short, clad with short hairs. Skull and mandible very massive; auditory bullæ long and pear-shaped; malar with strong superior and inferior angles; infraorbital opening with no groove for the nerve. Incisors very broad. Grinding-teeth rootless, with kidney-shaped crowns; the third molar above and below small and subcircular.

5. *Schizodon*, Waterhouse, P. Z. S. 1841, p. 91 . . . . . (1841).

External characters much as in *Ctenomys*, but the ears larger and the claws, though strong, not longer than the digits themselves. Skull less massive; the superior and inferior angles of the malar weaker; infraorbital opening with a groove for the nerve. Incisors broad, convex. Grinding-teeth placed transversely, with single external and internal folds, which meet in the middle.

6. *Spalacopus*, Wagler, Isis, 1832, p. 1219 . . . . (1832).

Ear rudimentary; tail short; claws of fore feet shorter than the digits. Skull shorter than in *Schizodon*; superior and inferior angles of malar obsolete; infraorbital opening smaller, with no separate canal for the nerve. Incisors broad, the upper arched boldly forward, the lower very long. Grinding-teeth like those of *Schizodon*; but the external and internal folds do not meet in the middle line.

7. *Octodon*, Bennett, P. Z. S. 1832, p. 46 . . . . (1832).

Ears rather large. Claws small, that of the pollex truncated. Tail long, hairy, bushy at the tip. Skull similar to that of *Spalacopus*, but with a separate canal in the infraobital opening for the nerve. Incisors narrow. Molars like those of *Spalacopus*, but placed diagonally, and the posterior lobe smaller than the anterior in the upper teeth.

8. *Habrocoma* (=*Abrocoma*), Waterhouse, P. Z. S. 1837. p. 30 (1837).

Ears very large. Fur very soft. Tail moderate, clad with short hairs, not tufted. Pollex obsolete. Skull with the facial portion elongated; malar with moderate superior and inferior angles; auditory bullæ very large. Incisors narrow. Upper grinding-teeth with single external and internal enamel-folds; the lower with one external and two internal folds, dividing them into narrow angular lobes.

C. ECHINOMYINÆ. Grinding-teeth semirooted or rooted, with deep, curved enamel-folds. Fur more or less harsh, often mixed with spines. Tail usually long. Neotropical and Ethiopian. Recent genera:—

9. *Carterodon*, Waterhouse, Nat. Hist. Mamm. ii. p. 351 (1848).

Muzzle blunt; ears moderate; tail short, clad with scales and rather long hairs. Skull broad, with no marked crests; frontals with delicate supraorbital ridges. Incisors broad, with longitudinal furrows and raised ridges. Upper grinding-teeth with one internal and two external enamel-folds; the lower similar but reversed.

10. *Myopotamus*, Geoffroy, Ann. du Mus. vi. p. 81 . . . (1805).

Muzzle blunt; pollex with a truncated nail; hind feet large, with the first four digits fully webbed and the fifth free; tail moderate, cylindrical, scaly. Skull elongated, with sharp occipital and sagittal crests; auditory bullæ small; paroccipital processes very long. Incisors flat, plain. Grinding-teeth as in *Carterodon*, but the lower with three internal folds.

11. *Cercomys*, F. Cuvier & Geoffroy, Mammifères, 6^{me} livr. (1829).

Muzzle pointed; ears rather large; fur without bristles or spines; pollex very small, with a short nail; hind feet not webbed; tail long, scaly. Skull ovate; frontals contracted, with sharp supraorbital ridges, coronoid process small. Incisors flat. Grinding-teeth with nearly circular crowns; the upper with one internal and three external enamel-folds; the lower similar but reversed.

12. *Loncheres*, Illiger, Prod. Syst. Mamm. p. 90 . . . . (1811).

Muzzle blunt; ears rather short; fur in most species mixed with flattened lanceolate spine; toes subequal; second digit of fore feet with a broad truncated nail; tail long, clad with scales and hairs. Skull like that of *Cercomys*. Incisors narrow. Upper grinding-teeth like those of *Cercomys*, but longer, with the middle folds usually meeting in the middle; the lower with one external and two internal folds.

13. *Mesomys*, Wagner, Wiegm. Arch. 1845, Th. ii. p. 145 (1845).

External characters as in *Loncheres*; but pollex with a short curved claw, fur without spines, and tail short, thickly haired. No distinct supraorbital ridges. Incisors broad. Upper grinding-teeth with one or two external folds; the lower similar but reversed.

14. *Echinomys* (=*Echimys*), Desmarest, Nouv. Dict. d'Hist. Nat. x. p. 45 . . . . (1817).

Muzzle pointed; ears larger than in *Loncheres*; feet narrower, the toes more uneven in length, fur usually mixed with spines. Palate shorter and broader. Incisors narrow. Grinding-teeth as in *Mesomys*.

15. *Dactylomys*, Is. Geoffroy, Ann. Sc. Nat. (2^me^ sér.) x. p. 126 (1838).

Ears short; tail long, scaly; fore feet with the pollex obsolete, and the third and fourth digits elongated, with short convex nails. Skull with proportionally small orbits and high occiput. Incisors flat. Grinding-teeth (except the lower premolar) each divided into two lobes, each of which has a single enamel-fold.

16. *Plagiodon* (=*Plagiodontia*), F. Cuvier, Ann. Sc. Nat. (2^me^ sér.) vi. p. 347 . . . . (1836).

Form stout; muzzle blunt; pollex rudimentary; outer hair coarse; under-fur silky; tail short, scaly. Grinding-teeth rootless, the upper with a deep enamel-fold running diagonally forward from near the internal posterior angle, and another running back from near the outer anterior angle; the lower with one external and two internal folds.

17. *Capromys*, Desmarest, Mém. Soc. d'Hist. Nat. i. p. 44 (1822).

External characters much as in *Plagiodon*; fur long and harsh; tail moderate or long, scaly, sparsely haired. Liver divided into minute lobules. Skull elongate, with no marked crests; malar deep; paroccipital process long. Incisors small, convex. Upper grinding-teeth with one internal and two external folds; the lower similar but reversed.

18. *Aulacodus*, Temminck, Monogr. de Mamm. i. p. 245 (1827).

Form stout; muzzle blunt; fur harsh; tail moderate, sparsely haired; fore feet with the pollex rudimentary and the fifth digit very short; hind feet with four digits, of which the outer is rudimentary. Skull with the facial portion much inflated; the brain-case small, with strong sagittal and occipital crests; parietals small; infraorbital opening with a separate canal for the nerve. Incisors very broad, the upper with three deep grooves. Grinding-teeth rooted, with folds arranged as in *Capromys*.

Family II. HYSTRICIDÆ.

Grinding-teeth with external and internal enamel-folds. Skull ovate, often greatly inflated by large air-sinuses in the bones; facial portion short and broad; malar with no inferior angle; occipital plane perpendicular, with a median ridge. Form robust; limbs subequal; fur more or less modified into spines and hollow quills. Two subfamilies:—

A. SPHINGURINÆ. Grinding-teeth rooted. Skull short; lachrymal bone not bounding the canal. Clavicles perfect. Upper lip unfurrowed. Tail moderate or long, usually prehensile. Soles of feet tuberculated. Four teats. Nearctic and Neotropical. Recent genera:—

1. *Chætomys*, Gray, P. Z. S. 1843, p. 21 . . . . (1843).

Head and body clad with stout wavy bristles; feet with four digits; the hind feet with a nailless tubercle instead of the first digit, and an internal lobe, supported by two accessory tarsal ossicles. Skull short; the frontal and malar with large postorbital process, which almost meet; walls of auditory meatus produced. Upper grinding-teeth each divided into three lobes, of which the anterior and posterior have deep single enamel-folds; lower teeth with one external and two internal folds.

2. *Sphingurus* (=*Sphiggurus*), F. Cuvier, Dents d. Mamm. p. 256 (1825)*.

Nostrils far apart; head and body clad above with short stiff spines, or with mixed spines and bristly hair; feet as in *Chætomys*; tail long, prehensile at its tip. Skull short; the air-sinuses greatly developed in some species; no postorbital processes; walls of auditory meatus not produced; interparietal broad; angle of mandible pointed. Grinding-teeth subequal, like those of *Sphingurus*, but with two lobes only.

3. *Erythizon*, F. Cuvier, Dents d. Mamm. p. 256 . . . (1825).

External characters as in *Sphingurus*, but the nostrils nearer together, the quills more concealed by hair, the hind feet with five toes and hardly any internal lobe; the tail short, thick, and non-prehensile. Skull with walls of auditory meatus slightly produced; angle of mandible rounded. Grinding-teeth like those of *Sphingurus*, but the anterior much longer than the posterior.

B. Hystricinæ. Grinding-teeth semirooted. Skull more elongate; lachrymal partly bounding the canal. Clavicles imperfect. Upper lip furrowed; tail not prehensile; soles of feet smooth; six teats. Palæarctic, Indian, and Ethiopian. Recent genera:—

4. *Atherura*, G. Cuvier, Règne Animal (2me éd.), i. p. 215 (1829).

Spines flattened, channelled; tail long, scaly, with a tuft of compressed bristles at the point. Nasal part of skull moderate. Upper grinding-teeth with one internal and three or four external folds, the latter soon separated as enamel-loops; the lower teeth similar, but reversed.

5. *Hystrix*, Linnæus, Syst. Nat. i. p. 76 . . . . (1766).

Spines cylindrical; tail short, covered with spines and slender-stalked open quills. Nasal cavity usually very large. Air-sinuses of frontals greatly developed. Teeth as in *Atherura*.

Family III. CHINCHILLIDÆ.

Incisors short; grinding-teeth divided by continuous folds into transverse laminæ. Malar extending forward to lachrymal, with no inferior angle, and only a rudimentary superior angle. Optic foramina confluent. Auditory bullæ moderate or very large. Palate contracted in front, and deeply emarginate behind. Clavicles perfect.

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* =*Synetheres* and *Sphiggurus*, F. Cuvier (1825) = *Cercolabes*, Brandt (1835).

Fore limbs small; hind limbs elongate, with four or five toes. Fur very soft. Tail moderate or long, bushy. Neotropical. Recent genera:—

1. *Chinchilla*, Bennett, Gardens &c. Zool. Soc. pt. i. p. 1 (1829).

Ears broad, not elongated. Fore feet with five digits; the pollex very small, but bearing a claw; hind feet with four digits. Tail long, bushy. Skull with the auditory bullæ enormous, appearing on the top of the skull between the supraoccipital, interparietal, and squamosals. Grinding-teeth rootless, with their enamel-folds nearly straight, each with three laminæ; the two anterior laminæ of the lower premolar imperfectly separated.

2. *Lagidium*, Meyer, Nov. Act. Acad. Nat.-Cur. xvi. p. 576 (1833).

Ears elongated. Both fore and hind feet with four digits. Skull as in *Chinchilla*, but the auditory bullæ more moderate, articulating on the top of the skull with the supraoccipital and squamosals only. Grinding-teeth similar, but their folds curved; all three laminæ of the lower premolar perfectly separated.

3. *Lagostomus*, Brooks, Tr. Linn. Soc. xvi. p. 102 . . . (1828).

Ears moderate. Fore feet with four digits, and hind feet with three; the tarsus elongated. Tail moderate, bushy, tufted. Skull more massive than in the other genera, with well-marked sagittal and occipital crests; auditory bullæ smaller, not appearing on the top of the skull; infraorbital opening with a separate canal for the nerve. Grinding-teeth with two laminæ, except the last upper molar, which has three.

Fossil genera:—

4. *Amblyrhiza*, Cope, Proc. Amer. Phil. Soc. xi. p. 183 . (1869).

Grinding-teeth semirooted, each with either four or five laminæ.

5. *Loxomylus*, Cope, *op. cit.* p. 187 . . . . (1869).

Grinding-teeth as in *Amblyrhiza*, but each with three laminæ only, their crowns obliquely sloped both longitudinally and laterally.

Family IV. DASYPROCTIDÆ.

Incisors long. Grinding-teeth semirooted, with external and internal enamel-folds. Milk-teeth long retained. Optic foramina separate; palate broad; incisive foramina short; mandible with the masseteric ridge obsolete. Clavicles rudimentary. Form somewhat slender, limbs moderate; upper lip entire; ears short; tail short and naked or rudimentary. Fore feet with five digits; hind feet with five or three; claws short and hoof-like. Neotropical. Recent genera:—

1. *Dasyprocta*, Illiger, Prod. Syst. Mamm. p. 93 . . . . (1811).

Form compact; limbs long; hind feet with three digits only; tail either obsolete or short and subnaked. Skull elongate, smooth; infraorbital opening with no separate canal; malar simple; paroccipital processes short. Upper grinding-teeth with one internal and three or four external folds, the latter soon separated as isolated enamel-loops; the lower teeth similar but reversed.

2. *Cœlogenys*, F. Cuvier, Ann. du Mus. x. p. 203 . . . (1807).

Muzzle obtuse; skin of cheeks reflected below the zygoma; hind feet with five digits; tail reduced to a tubercle. Skull with the zygoma enormously inflated, the anterior two thirds composed of the maxillary zygomatic process, which is hollowed out below into a great chamber, lined with mucous membrane and communicating with the mouth; infraorbital opening with a canal for the nerve; paroccipital processes long. Upper grinding-teeth with two internal and three external folds, except the third molar, which is reversed; lower teeth with one external and three internal folds.

Family V. DINOMYIDÆ.

Incisors broad. Grinding-teeth rootless, with folds dividing them into transverse lobes. Optic foramina confluent. Paroccipital processes short. Palate broad. Clavicles imperfect. Manubrium broad. Upper lip cleft. Hair harsh. Tail rather long, bushy. Both fore and hind limbs with four digits; claws as in the last family. Neotropical. Recent genus:—

1. *Dinomys*, Peters, Monatsb. Ak. Berlin, 1873, p. 551 (1873).

(Characters those of the family.)

Family VI. CAVIIDÆ.

Incisors short. Grinding-teeth with folds dividing them into transverse lobes. Milk-teeth shed during fœtal life. Optic foramina separate; paroccipital processes long and curved; palate contracted in front; mandible with a strong masseteric ridge. Clavicles imperfect. Upper lip entire; ears short or long; fur moderately soft; tail very short or absent. Fore feet with four digits, hind feet with three only; claws as in last family. Neotropical. Recent genera:—

1. *Cavia*, Pallas, Misc. Zool. p. 30 (*ex* Klein, 1751) . . (1766).

Body plump; limbs very short, subequal; ears short; hind feet not palmated; no external tail. Skull much depressed; malar slender; palate much contracted in front, deeply emarginate behind, exposing the præsphenoid; incisive foramina long. Grinding-teeth each divided into two angular lobes.

2. *Dolichotis*, Desmarest, Mammalogie, p. 360 . . . . . (1822).

Limbs and ears long; tail very short or rudimentary. Skull less depressed than in *Cavia*, and the facial portion comparatively larger; palate still more deeply emarginate, exposing the vomer; incisive foramina long. Grinding-teeth each divided into two angular lobes, except the third upper molar and the lower premolar, which have each three lobes.

3. *Hydrochœrus*, Brisson, Règn. An. p. 116 . . . . (1756).

Body massive; limbs moderate; muzzle very blunt; eyes and ears small; tail obsolete; hair coarse and sparse; all the feet fully webbed. Skull massive; malar very deep; palate produced behind the last molar; incisive foramina short; paroccipital processes very large and long. Upper incisors grooved in front; upper grinding-teeth each with two lobes, united only by cement, except the third molar, which has twelve narrow transverse plates; lower premolar and first molar with three narrow lobes, the second and third with four.

Suborder II. GLIRES DUPLICIDENTATI.

Incisors $\frac{4}{2}$, at birth $\frac{6}{2}$; the outer upper incisors soon lost; the next pair very small, placed directly behind the large middle pair; their enamel continuous round the tooth, but much thinner behind. Skull with the optic foramina confluent, with no true alisphenoid canal; incisive foramina usually confluent; bony palate reduced to a bridge between the alveolar borders. Fibula ankylosed to tibia below, and articulating with the calcaneum. Testes permanently external; no vesicular glands. Two families:—

Family I. LAGOMYIDÆ.

Either one or two premolars above and below; grinding-teeth rootless, with transverse enamel-folds dividing them into lobes. Skull depressed; frontals contracted, with no postorbital processes; facial surface of maxillary with a single perforation; posterior angle of malar produced almost to the auditory meatus; basisphenoid not perforate, nor separated by a fissure from the vomer; coronoid process in the form of a tubercle. Clavicles complete. Ears short. Hind limbs not markedly elongated. No external tail. Palæarctic and Nearctic. Recent genus:—

1. *Lagomys*, G. Cuvier, Tabl. Elém. de l'Hist. Nat. p. 132 (1798).

External characters those of the family; two premolars above and below.

Fossil genus:—

2. *Titanomys*, Von Meyer, Jahrb. für Mineralog. 1843, p. 393 (1834).

One premolar only, both above and below.

Family II. LEPORIDÆ.

Three premolars above, and two below; grinding-teeth as in last family. Skull compressed; frontals with large wing-shaped postorbital processes; facial portion of maxillaries minutely reticulated; basisphenoid with a median perforation and separated by a fissure from the vomer; coronoid process represented by a thin ridge of bone. Clavicles imperfect. Ears and hind limbs elongated. Tail short, bushy, recurved. Cosmopolitan (except Australasian region). Recent genus:—

1. *Lepus*, Linnæus, Syst. Nat. i. p. 77 . . . . (1766).

External characters those of the family; all the grinding-teeth with three narrow laminæ, except the last lower molar, which is small and simple.

Fossil genus:—

2. *Palæolagus*, Leidy, Proc. Acad. Philad. 1856, p. 89 . (1856).

Incisors longer than in *Lepus*, first lower premolar with only two laminæ.

Suborder III. GLIRES HEBETIDENTATI (subord. nov.).

Incisors $\frac{2}{1}$; the second lower pair very small, and placed rather behind the middle pair, their enamel continuous round the tooth, and their crowns transversely hollowed, not chisel-edged. Grinding-teeth rootless, curved, with their convexity directed outwards. Mandibular condyles and glenoid cavity transverse. Fibula articulating with the calcaneum. One family:—

Family I. MESOTHERIIDÆ.

Two premolars above and one below; grinding-teeth rootless, with single reentering enamel-folds. Skull massive, with sagittal and occipital crests enormously developed, the latter running forwards at the sides to the zygoma; frontals with large postorbital processes; infraorbital opening small; malar very deep, running forward to the lachrymal; auditory bullæ moderate; paroccipital processes long; bony palate perfect, produced behind the molars; mandible resembling in form that of *Leporidæ*. Clavicles perfect; scapular and humerus resembling those of *Castoridæ*. Both fore and hind limbs with five digits, claws probably short and hoof-like. Ischia articulated with two of the caudal vertebræ. Pliocene of South America. Fossil genus:—

1. *Mesotherium*, Serres, Compt. Rend. Ac. Paris, xliv. p. 961 (1857).

(Characters those of the family.)

P.S. Since this paper was written I have been much pleased to find that the researches of my friend Mr. A. Doran, of the Royal College of Surgeons, into the form of the auditory ossicles of mammals, essentially confirm the views of affinity here adopted. Mr. Doran's observations are yet unpublished; and it will be sufficient here to indicate their more general result. He finds in the auditory ossicles of the more typical Sciuromorpha a different type from that presented in the typical Myomorpha. *Castor*, though aberrant, approaches nearest to *Arctomys*; and *Anomalurus* is very close to *Sciurus*. Among the Myomorpha, *Bathyergus* has the characteristic type of the Hystricomorpha, in which, with few or no exceptions, the malleus and incus are ankylosed together; and *Dipus* inclines in the same direction. The ossicles of the GLIRES DUPLICIDENTATI present a distinct and less specialized type.

3. On the Land-Shells of Taviuni, Fiji Islands, with Descriptions of New Species. By E. A. LIARDET.

[Received December 14, 1875.]

(Plate V.)

The land-shells of Taviuni, one of the Fiji group of islands, are neither conspicuous for the number of their species nor for the beauty of their colouring. They mostly inhabit the coast-lands, and are all minute.

At a slight elevation a moderately large *Helix* (*H. casca*) and a *Bulimus* are common. Some *Helicinæ* may also be found, but are rare. *Pupinæ* I have only found at elevations from about five hundred feet and upwards, and mostly under decayed logs. *Partulæ* frequent the underside of the leaves of *Dracænæ* and Dilo-trees near the coast. *Partula lirata* is the only one I met with.

But if the want of size or beauty of colouring renders these shells less sought for by the ordinary collector, yet to the naturalist their structure and the habits of their occupants must always be a source of interest.

The natives of Fiji cannot be induced to seek in the dense forests for shells; consequently the only way is for the collector to trust to his own researches. This I did; but the result has fallen far short of my expectations.

Considering the moist temperature, dense vegetation, and mountainous character of the island, all so conducive to the abundant existence of land-mollusca, their scarcity is a matter of surprise. They mostly locate under logs and stones, seldom being exposed to the sun, which, no doubt, accounts for the absence of rich colour in any of the species.

The numerous small shells on the coast-lands are common to most of the islands; and being found sheltered by bark on logs and in the decaying husks of old cocoa-nuts, it may be inferred that they have frequently been transported from island to island—and though in some cases destroyed by a subsidence, have again, since the uprising, once more colonized the coast. The island of Taviuni would seem to establish this inference; for it is only at a height of some five hundred feet that *Pupinæ* and the larger species of *Bulimus, Helix,* and *Helicina* are found. Now coral-indications show this island to have been submerged to that level; I would therefore conclude that the last-mentioned shells are the true representatives of the molluscan fauna of that part of the former continent whose peaks are now the islands of Fiji.

In preparing the following descriptions of species believed to be new I have to acknowledge the assistance I have received from Mr. Henry Adams.

1. NANINA? TAVIUNIENSIS, sp. nov. (Plate V. figs. 1, 1*a*, *b*.)

Shell globose, minutely perforated, of a light brown colour, smooth and highly polished; whorls 5, convex; spire obtuse; suture impressed; aperture nearly vertical, roundly lunate; columella short, excavated, white, with a callous curved tooth near the base.

Animal very active. I observed it on one occasion, when interrupted in progression, lift its tail high, as in figure 1*a*, and shake it vigorously.

Hab. Islands of Taviuni and Gamia, Fiji. Rare. (Coll. Liardet.)

2. NANINA? VITRININA, sp. nov. (Plate V. figs. 2, 2 *a*.)

Shell yellow, thin, translucent, perforated, discoidal; whorls 4¼, last subangulated, the others slightly convex; beneath shining and well rounded; aperture slightly oblique, lunate; suture marginate; peristome thin; columellar lip slightly expanded over perforation. Animal black, with mantle covering two thirds of the shell, which it cannot enter at first.

Found in moist situations under logs, in this respect resembling *Vitrina*. (Coll. Liardet.)

3. NANINA? RAMSAYI, sp. nov. (Plate V. fig. 3.)

Shell similar to *N.? vitrinina*. When the animal is out I can detect no difference.

Animal red; a protuberance on the back rests against the shell anteriorly. It progresses by raising its head, extending the body, and placing the posterior part of the foot down in the form of an arch, lands its body gradually from the head; and this arch thus appears to recede until the caudal extremity is reached. Like *N.? vitrinina*, it cannot at first recede into its shell; and like *Vitrina strangei* of Australia, it leaves mucus in its track of a brick-red colour.

Hab. Taviuni, Fiji. (Coll. Liardet.)

4. HELIX PRINCEI, sp. nov. (Plate V. figs. 4, 4 *a*.)

Shell very small, depressed, with wide and perspective umbilicus; colour dark brown; whorls 3, prominently costated; suture deeply impressed; aperture round.

Note.—This is the only Fijian shell I have seen resembling any of the Australian *Helices*.

Hab. Taviuni, Fiji. (Coll. Liardet.)

5. HELIX PINNOCKI, sp. nov. (Plate V. figs. 5, 5 *a*.)

Shell conoid, perforate; colour a horny yellow; convex beneath; whorls 6, spirally striated, the last carinated, smooth beneath; aperture oblique, roundly lunate; columellar lip slightly expanded over perforation.

Hab. Taviuni, Fiji. (Coll. Liardet.)

6. HELIX BARKASI, sp. nov. (Plate V. fig. 6.)

Shell minute, trochiform, very minutely perforated, colour golden horny; whorls 5½, convex, roughly and irregularly striated, transversely ribbed, last whorl acutely carinated; beneath slightly convex; striæ radiating from the perforation; aperture oblique and triangular.

Hab. Taviuni, Fiji. A scarce shell. (Coll. Liardet.)

7. Helix clayi, sp. nov. (Plate V. fig. 7.)

Shell minute, turbinate, minutely perforate, of a golden horny colour; spire obtuse; whorls 5, convex, last slightly carinate, very finely, closely, and regularly striated; beneath smooth and shining; aperture oblique, roundly lunate.

Hab. Taviuni, Fiji. (Coll. Liardet.)

8. Lamellaria perforata, sp. nov. (Plate V. figs. 8, 8 *a*.)

Shell small, acute, polished, dark brown colour; epidermis thin; whorls 5½, convex, spirally striate, with a white apertural lamina; aperture oblique, pyriform; columellar lip white, projecting from the base of the shell, expanding slightly over region of umbilicus; outer lip impressed and of a deep purple tint.

This shell is found embedded in the bark of dead logs.

Note.—The animal has the tips of the eye-pedicels bulbous.

Hab. Taviuni, Fiji. (Coll. Liardet.)

9. Diplommatina taviensis, sp. nov. (Plate V. figs. 9, 9 *a*.)

Shell with the penultimate whorl contracted in front, leaving the previous one and lip of the aperture joining regularly costated; lip double; aperture circular and entire.

Animal with two tentacles, short and cylindrical, with an active arched motion, as in *Helicina*. Eyes situated at the base of tentacles inside.

Hab. Taviuni, Fiji. (Coll. Liardet.)

10. Lagocheilus hispidus, sp. nov. (Plate V. figs. 10, 10 *a*.)

Shell small, bulimiform, hispid, of a brown colour; whorls 5½, spirally costate; aperture circular.

Very rare.

Hab. Gamia, Fiji. (Coll. Liardet.)

11. Omphalatropis vitiensis, sp. n. (Plate V. figs. 11, 11 *a*.)

Shell bulimiform, acute; colour brown or yellow; whorls 5, last convex, with a keel round the base of the shell encircling the umbilicus, and terminating in a tongue-shaped process at the base of the aperture; epidermis thin; aperture pyriform; lip thickened.

Hab. Islets off Taviuni, Fiji. (Coll. Liardet.)

EXPLANATION OF PLATE V.

Fig. 1, 1*a*, *b*. *Nanina? taviuniensis.*
2, 2*a*. *Nanina vitrinina.*
3, *Nanina ramsayi.*
4, 4*a*. *Helix princei.*
5, 5*a*. *Helix pinnocki.*
6. *Helix barkasi.*

Fig. 7. *Helix clayi.*
8, 8*a*. *Lamellaria perforata.*
9, 9*a*. *Diplommatina taviuniensis.*
10, 10*a*. *Lagocheilus hispidus.*
11, 11*a*. *Omphalotropis vitiensis.*

4. Notes on the Rails of the Argentine Republic.

By W. H. Hudson, C.M.Z.S.

[Received December 19, 1875.]

The Carau or Courlan (*Aramus scolopaceus*) has been called "an abnormal relative of the Rails at the most;" but in habits and appearance it is certainly near akin to them.

The beak of this bird is nearly 5 inches long, straight, and of an iron hardness; the tip is slightly bent to one side, the lower mandible somewhat more than the upper. The tongue extends to the extremity of the beak; at the end it is of a horny toughness, and frayed or split into filaments. This beak is a most effective instrument in opening shells; for where mollusks abound the Courlan subsists exclusively on them, so that the margins of the streams which this bird frequents are strewn with innumerable shells lying open and emptied of their contents.

Every shell has an angular piece, half an inch long, broken from the edge of one valve. Mussels and clams close their shells so tightly that it would perhaps be impossible for a bird to insert his beak, however knife-like in shape and hardness, between the valves in order to force them open; therefore I believe the *Aramus* first feels the shell with his foot whilst wading, then with quick dexterity strikes his beak into it before it closes, and so conveys it to the shore. It would be most difficult for the bird to lift the closed shell from the water and carry it to land; but supposing it could do this, and afterwards succeeded in drilling a hole through it with its beak, the hole thus made would have jagged edges, and be irregular in shape; but it is, as I have said, angular and with a clean edge, showing that the bird had just thrust his beak half an inch or an inch between the valves, then forced them open, breaking the piece out during the process, and probably keeping the shell steady by pressing on it with the feet.

By day the *Aramus* is a dull bird, concealing itself in dense reed-beds in streams and marshes. When driven up he rises laboriously, the legs dangling down, and mounts vertically to a considerable height. He flies high, the wings curved upward and violently flapped at irregular intervals; descending, he drops suddenly to the earth, the wings motionless, pointing up, and the body swaying from side to side, so that the bird presents the appearance of a falling parachute. On smooth ground he walks faster than a man, striking out his feet in a stately manner and jerking the tail, and runs rapidly ten or twelve yards before rising. At the approach of night he becomes active, uttering long clear piercing cries many times repeated, and heard distinctly two miles away. These cries are most melancholy, and, together with its mourning plumage and recluse habits, have won for the *Aramus* several pretty vernacular names. He is called the "Lamenting Bird" and the "Crazy Widow," but is more familiarly known as the "Carau."

Near sunset the Caraus leave the reed-beds and begin to ascend the streams and visit their favourite fishing-sites. They are very active at night, retiring again at the approach of morning, and sometimes spend the day perched on trees.

As the breeding-season draws near they become exceedingly clamorous, making the marshes resound day and night with their long wailing cries. The nest is built amongst the rushes, and contains ten or twelve eggs, large for the bird, slightly elliptical, sparsely marked with large blotches of pale brown and purple, the whole egg having a cloudy appearance. When the nest is approached, the parent birds utter sharp angry notes as they walk about at a distance from the intruder. Young and old birds live in company till the following spring.

The Carau is more nocturnal than the Rails, and, having a far more powerful flight, takes to wing more readily: in general appearance, and in its gestures and motions when on the ground and when rising, it closely resembles them.

The Jacana (*Parra jacana*), arrives from the north in Buenos Ayres early in October, coming singly or in small parties. In their migration they appear to follow the course of the Plata; and, though some individuals are found breeding inland, they are for the most part confined to the littoral marshes.

The Jacanas journey by very easy stages, frequently alighting to rest by the way; for they are so incapable of sustained flight that boys on the pampas occasionally take them, pursuing them on horseback till the birds drop down exhausted. I believe the migratory Rails travel in the same way—a matter not easily determined, as they migrate by night; but they are feeble-winged creatures, and when driven to rise flutter away as if wounded. I have observed the Jacanas migrating by day, but would not for this reason affirm that they do not journey by night, since the Bartram's Sandpiper and other species journey both day and night.

The Jacana flies swiftly, in a straight line and close to the surface: the wings flutter rapidly; and there are frequent intervals of gliding. When rising it presents a most novel appearance, as the lovely pale green of the wings is quite concealed when the bird is at rest; the beauty of its flight is thus greatly enhanced by the sudden display of a hue so rare and delicate. At a distance from the beholder, and in a strong sunshine, the wings appear of a shining golden yellow. Not only when flying does the Jacana make a display of its beautiful wings; without rising it has a way of exhibiting them, appearing to delight as much in them as the Cockatoo does in its crest or the Peacock in its train. When several of these birds live in company, occasionally they all in one moment leave their feeding, and with quick excited notes, and clustering together in a close group, go through a singular and pretty performance, all together holding their wings outstretched and agitated, some with a rapid fluttering, others a slow-moving leisurely motion like that of a butterfly sunning itself. The performance over, the birds peaceably scatter again. I have never observed Jacanas fighting.

Soon after coming they pair, and build a simple nest with few materials, usually on the floating weeds; the eggs are four, in shape like Snipes' eggs, and have deep-brown spots on a pale yellowish-brown ground. During incubation the male keeps guard at some distance from the nest, and utters a warning cry at the approach of an intruder; the female instantly flies from the nest, but in rising renders herself very conspicuous. When the nest is approached the parent birds hover about, occasionally fluttering as if wounded, all the time keeping up a clamour of hurried angry notes somewhat resembling the barking cries of the Black-collared Stilt.

The Jacana has always appeared to me strictly diurnal in its habits.

Some of our Rails and Rail-like birds I will pass over, either because I have not learnt their habits or have failed to discover any thing interesting in them not known already, as in the case of our two species of *Fulica*.

I will mention, in passing, that the Bartram's Sandpiper (*Actiturus bartramius*), judging purely from its habits, is a near relation of the Rails. This species, I believe, has not had a place assigned it in the Argentine avifauna—a strange oversight; for it is one of our commonest birds.

I will now give a brief account of *Rallus rhytirhynchus*, of *Porzana erythrops*, and of that king of Rails the *Aramides ipecaha*.

The Black Rail (*Rallus rhytirhynchus*) abounds everywhere in the La-Plata region where reeds and rushes grow. They are always apparently as abundant in winter as in summer; this fact has surprised me greatly, since I know this species to be migratory, their unmistakeable cries being heard overhead every night in spring and autumn, when they are performing their distant journeys. Probably all the birds frequenting the inland marshes on the south-western pampas migrate north in winter; and all those inhabiting the shores of the La Plata and the Atlantic sea-board, where there is abundant shelter and a higher temperature, remain all the year. On the Rio Negro of Patagonia the Black Rails are resident; but the winter of that region is mild; moreover the wide expanse of barren waterless country lying between the Rio Negro and the moist pampas region would make migration from the former place impossible to such a feeble flyer. Of this instinct we know at least that it is hereditary; and it is hard to believe that from every one of the reed-beds distributed over the vast country inhabited by the Black Rail a little contingent of migrants is drawn away annually to winter elsewhere, leaving a larger number behind. Such a difference of habits cannot possibly exist amongst individuals of a species in one locality; but differences, in the migratory as in other instincts, great as the one I have mentioned, are found in *races* inhabiting widely separated regions.

It is difficult to flush the Black Rails; they rise in a weak fluttering manner, the legs dangling down, and after flying forty or fifty yards drop again into the reeds. Their language is interesting. When alarmed the bird repeats, at short intervals, a note almost painful from its excessive sharpness; it utters it standing on a low branch or other elevation, but well masked by reeds and bushes, and incessantly bobbing its head, jerking its tail, and briskly turning from side to side. It has at such times a very sprightly appearance, whilst the long tricoloured beak, the blood-red eye, and vermilion legs admirably contrasting with the fine dark plumage, give it some claims to beauty. At other times it has a hollow call-note with a puzzling ventriloquism in the sound; this note is sometimes repeated at brief intervals for an hour at a time; and whilst uttering it the bird stands, as usual, on a slight eminence, but in a listless attitude, and without any of the nods and becks and other frisky gestures. It has also a kind of song, frequently heard; the common people fancy it resembles the distant braying of an ass; hence the vernacular name "Burrito," by which the bird is known in the Plata. It is heard occasionally in the day, but oftenest in the evening, and is a confused performance, uttered without pause, and composed of several long shrill notes, modulated and mingled with others hollow and booming. These notes can be heard a thousand yards away; but far or near they always sound remote.

I can say little of *Porzana erythrops*, called with us "Gallinetita," or Little Hen, though it visits Buenos Ayres annually, breeds, and is abundant there. In language and habits it is like a Coot, not often seen on land, and feeding principally as it swims about in a jerky manner amongst the floating weeds. It appears in October, migrating exclusively, I think, by night; and after the autumnal departure an individual is rarely seen. By day they are shy and retiring, but scatter abroad in the evening, frequently uttering their strange hollow cry, called "witch-laughter" by superstitious people, and resembling a sudden burst of hysterical laughter, the notes beginning loud and long, becoming brief and hurried as they die away.

The *Aramides ipecaha*, called in Buenos Ayres "Gallineta," is a most interesting bird. Without any brilliant tints, there is something so pleasing to the eye in the various hues of its plumage—light brown and drab-colour, blue, grey, buff, and black—all these colours so harmoniously disposed (the effect heightened by the yellow beak, golden-red eye, and vermilion legs), that I do not know a handsomer waterfowl.

They are found as far south as the thirty-fifth parallel of latitude, and are most abundant along the marshy borders of the Plata, frequenting the vast reed-beds and forests of water-loving *Erythrina crista-galli*. When they are not persecuted they are bold pugnacious birds, coming out of the reeds by day and attacking the domestic poultry about the houses and even in the streets of the villages situated on the borders of their marshy haunts. But when compelled to place Man on the list of their enemies, it is a difficult matter to get a sight of one; for, like all birds that rise laboriously, they are vigilant to excess, and keep themselves so well concealed that one may pass through their haunts every day of the year, and the Ipicaha still be to him no more than a "wandering voice." But even persecution does not entirely obliterate a certain inquisitive boldness that is one of the strongest traits of their character. Usually they roam singly in quest of food, but have reunions in the evening and occasionally during the day, especially in gloomy weather.

Where there are forests, and on misty or rainy days, they stray to a distance from the reeds. They walk with an easy and somewhat stately grace, jerking up the tail, Rail-like, at every stride, and run with a velocity no man can equal. Occasionally they perch on trees, and are fond of strutting to and fro on a horizontal branch.

When surprised on the open ground the Ipecaha lies close, like a Tinamou, refusing to rise until almost trodden upon. It springs up with a loud-sounding whirr, rushes violently through the air, till, gaining the reeds, it glides a few yards and then drops : its flight is thus precisely like that of the Tinamou, and is more sounding and violent than that of the Grouse or Partridge. On spying an intruder it immediately utters a powerful cry, in strength and intonation not unlike that of the Peafowl. This note of alarm is answered by other birds at a distance as they hastily advance to the spot where the warning was sounded. The cry is repeated at irregular intervals, first on one hand, then on the other, as the birds change their position to dog the intruder's steps and inspect him from the reeds. I have surprised parties of them in an open space, and shot one or more ; but no sooner had the survivors gained their refuge than they turned about to watch and follow me, sounding their powerful alarm the whole time. I have frequently been followed half a mile through the rushes by them, and, by lying close and mimicking their cries, have always succeeded in drawing them about me.

But the Ipecaha's loudest notes of alarm are weak compared with the cries he utters at other times, when, untroubled with a strange presence, he pours out his soul in screams and shrieks that amaze the listener with their unparalleled power. These screams, in all their changes and modulations, have a resemblance to the human voice, but of the human voice exerted to its utmost pitch, and expressive of agony, frenzy, and despair. A long piercing shriek, astonishing for its strength and vehemence, is succeeded by a lower note, as if in the first one the creature had well-nigh exhausted itself. The double scream is repeated several times; then follow other sounds, resembling, as they rise and fall, half-suppressed cries of pain and moans of anguish. Suddenly the unearthly shrieks are renewed in all their power. This is kept up for some time, several birds screaming in concert; it is renewed at intervals throughout the day, and again at set of sun, when the woods and marshes resound with the extravagant uproar. I have said that several birds unite in screaming; this is invariably the case. I have enjoyed the rare pleasure of witnessing the birds at such times; and the screams then seem a fit accompaniment to their disordered gestures and motions.

A dozen or twenty birds have their place of reunion on a small area of smooth clean ground surrounded by reeds; and by lying well concealed and exercising some patience one is enabled to watch their proceedings. First one bird is heard to utter a loud metallic-sounding note, three times repeated, and somewhat like the call of the Guinea-fowl. It issues from the reeds, and is a note of invitation quickly responded to by other birds on every hand as they all hurriedly repair to the customary spot. In a few moments, and almost simultaneously, the birds appear, emerging from the reeds and running into the open space, where they all immediately whirl about and begin the exhibition.

Whilst screaming they rush from side to side as if possessed with frenzy, the wings spread and agitated, the beak wide open and raised vertically. I never observed them fight or manifest anger towards each other during these performances; and, knowing the pugnacious spirit of the Ipicahas, and how ready they are to seek a quarrel with birds of other species, this at first surprised me; for I was then under the mistaken impression that these gatherings were in some way related to the sexual instinct.

Whilst watching them I also remarked another circumstance. When concealing myself amongst the rushes I have been compelled to place myself so disadvantageously, owing to the wet ground, that any single bird straying accidentally into the open space would have discovered my presence immediately; yet the birds have entered and finished their performance without seeing me; so carried away are they by the emotion that possesses them during these moments. But no sooner has the wild chorus ended than, aware of my presence, they have fled precipitately into the reeds.

How could this curious habit I have described, and which cannot be considered advantageous, have originated? It is simply that this species has a somewhat singular way of giving expression to an instinctive feeling common to all creatures. Many birds and mammals have social gatherings, peaceful like those of the Ipicaha; and if seen to fight, these are but playful engagements; for the emotion that calls them together is a joyous one. It manifests itself so variously in different species that a person might easily be led to believe that the displays he observes are, in many instances, inspired by the sexual passion.

The *Ibis melanotis*, the Glossy Ibis, the Black-collared *Himantopus*, and the Spurred-winged Lapwing also hold similar exhibitions. The last-named species has a far more remarkable performance on the ground, aptly called "dancing" by the Argentine peasants; for the birds, in twos and threes, run and whirl about and stand bowing till their beaks touch the ground, all the time regulating their movements to drumming rhythmic notes.

The Chimangos (*Milvago*) frequently have meeting-places where they circle about, sportively quarrelling in the air, then rest, each one on his separate perch; and at intervals one bird utters a long and song-like cry, followed by a succession of short notes, in which all the birds join as in a chorus.

Males and females of many species in which the sexes are always faithful sing and scream together in a jubilant manner at intervals through the day. This habit is most remarkable in the Oven-bird (*Furnarius*): these stand together facing each other, singing their shrill excited song, all the while beating their outspread wings in time with the notes, and each bird taking a part, so that the performance produces the effect of harmony.

The Chajas (*Chauna chavaria*) also sing in concert, "counting the hours," as the Gauchas say; for they sing about nine o'clock in the evening and again just before dawn.

Still more remarkable is the habit in the Scissor-tail (*Milvulus tyrannus*); for these birds are not gregarious, and yet once a day they rise up and, hurrying from tree to tree, summon each other to a general gathering; then, mounting with sharp chirping notes, they precipitate themselves violently downwards from a great height, their long tails opening and closing, their zigzag flight accompanied with impetuous "whetting" and "grinding" notes.

The Tinamous unite in small coveys and play, running about in circles, rapidly doubling and suddenly crouching as if to conceal themselves.

Tyrant-birds and Thrushes chase each other screaming through the air and amongst the trees. Hard-billed singing-birds sing in concert on trees and bushes, and sometimes pursue each other and fight all the time they are singing. Some Ducks fight mock battles on the water. The habit is different in the Chiloe Widgeon (*Mareca chiloensis*); for this Duck has an easy and powerful flight. In small flocks they rise until they become mere specks in the sky; at that vast height they hover, all the time singing their shrill notes, and close and separate and close again; and every time they close they slap each other so smartly with their wings that the blows can sometimes be heard when the birds have quite vanished from sight.

Many mammals also have meetings and rejoice together, some species even having set performances; but the habit is less noticeable in them, as they are not so impressionable by nature as birds, and are also less buoyant in their motions, and less garrulous.

In all the instances I have given, the sexual passion is in no way concerned; for these gatherings and displays take place at all seasons of the year, and are in some cases less frequent during the season of courtship. It is impossible to doubt that the cause is simply the natural gladness felt by all sentient beings at times, when hunger is satisfied and they are free from the restraints imposed by other emotions. It is to a great extent an associate feeling, and, in species accustomed to meet and to indulge in it with frequency, is instantaneously communicated from one to the other. Every shepherd and herdsman on the pampas is familiar with the fits of joy that seize his domestic or semi-domestic cattle. Thus a lamb in a flock will suddenly spring up two or three times in quick succession, coming down on his four feet together; and instantly his companions become possessed with a joyous contagion, and, breaking away from their dams, they fly off in pursuit. Suddenly they all stop and group themselves together; but in a few moments another lamb springs up and bounds away, and the chase is renewed.

It is not to be wondered at that some species should have not only a definite and unchangeable manner of manifesting their joyousness, but should give it such extravagant expressions as, for example, the Ipecaha does, whilst in others it shows itself in the most subdued manner or not at all; for some animals are incapable of expressing even feelings so violent as pain, fear, anger, and solicitude for their young. But that the feeling exists at times in all I am pretty sure, even in so melancholy a creature as the Heron.

Probably the concert-screaming of Foxes and Monkeys and many other animals, the pretty "showing-off" of Jacanas and other birds, and the aerial vagaries of Snipes, accompanied by peculiar sounds called "bleating" or "drumming," and a hundred more strange performances are due to the same cause.

5. On the African Rhinoceroses.

By the Hon. W. H. Drummond.

[Received December 20, 1875.]

I believe that at present naturalists have arrived at no decided conclusions as to the number of species of Rhinoceros inhabiting Africa; and as I have had some practical experience on the subject I beg leave to offer these few remarks for their consideration.

As far as my own experience and the inquiries I have made of natives well acquainted with the facts, and of European travellers and hunters who were equally qualified to offer an opinion, have gone, I believe, in accordance with the recorded opinions of most travellers and sportsmen who have given any attention to the subject, that there are four distinct species; while if *R. oswellii* be not merely a variety of *R. simus*, as I am inclined to think it is, it would follow that there was one more. These I would class as follows:—*R. simus*, the "Mohohu" of the Bechuanas, and the "Umkave" or "Umkombewoquobo" of the Amazulu, Amatabili, and Ama Tonga tribes; *R. keitloa*, the Keitloa of the west, and Umkombe Tovote of the east; *R. bicornis major*, the greater black species, known as the Kulumane on the eastern side, while in South Central Africa (I mean the country north of the Transvaal Republic, and south of the Zambesi) it is, I believe, known as the "Borele;" and *R. bicornis minor*, the small black species, known up to the Limpopo as the "Upetyane," and among the Dutch republics to the north as the "Klin rhinaster." To these must, I suppose, be added *R. oswelli*, or the "Kabaoba," until we are in a position to prove conclusively that it is merely a variety, as I think, for reasons hereafter to be stated, will ultimately prove to be the case.

Of the above, *R. simus* and *R. oswellii* are those generally known as the "white," while *R. keitloa*, *R. bicornis major*, and *R. bicornis minor* are called the "black;" and before proceeding further I should like to say a few words about the nomenclature I have made use of, and which (with the exception of the introduction of what I believe to be a distinct species, which for want of a better name I have called *R. bicornis minor*, the Small Black Rhinoceros or Upetyane) is the nomenclature I believe to be in general use. The distinction, however, of black and white seems to me misleading and misapplied, all Rhinoceroses being of the same colour, namely a peculiar shade of brown, or, if any difference does exist, it being in *R. bicornis minor* possessing a tinge of red. That to different observers, and in different localities, they do appear to be of different colours (Baldwin mentions a blue kind) is undoubted; but, except any slight variation that may locally exist, from the animal, as in Darwin's theory of protective resemblance, conforming to the prevailing colour of the district it inhabits, all such cases may be referred to outward circumstances, such as the position of the sun, or the kind of mud they may have been rolling in last, and partly, no doubt, to the age and sex of the animal. In exemplification of this, I may mention that I have watched a bull of *R. simus* trotting past me in the full glare of the midday sun, and it has appeared to me almost white; while after following the same animal up, and finding it feeding with the long shadows of evening on it, its colour has then seemed to be, as it really is, a deep brown. It may also be worthy of notice that no system seems to have been pursued in giving the scientific names under which these species are known. *R. simus*, the snub- or square-nosed Rhinoceros, is appropriate enough, as referring to one of its most distinctive points, while *R. oswelli* is named after the gentleman who discovered it; but the term *bicornis*, though no doubt applicable, would be equally so to every one of the five species, and would be most especially so to *R. keitloa*, in which the two horns are of almost equal length, while its present name, *keitloa*, being merely a native and local designation, conveys nothing to those unacquainted with the language.

R. simus, the common white Rhinoceros, requires but little description from me, being, as we all know, a well-recognized species. It is the greatest in size, and is remarkable for the length the front horn grows to, as well as its gentle and inoffensive disposition. Its food is, as far as my experience goes, solely grass. The country over which I can personally speak as to its existence, extends from Zululand up to the Limpopo; from there it incontrovertibly reaches the Zambesi; while Speke mentions it in Karagweh, and Andersson between Walwich Bay and Lake Ngami and in Ovampoland. Sir Samuel Baker tells me that he saw at Khartoum a horn "immensely thick at the base, and about 2½ feet long, which came from the countries west of the Nile;" and though for some reason which he did not state he thinks it was not the horn of a "White Rhinoceros," yet, unless we conclude that a species exists of which we have hitherto heard nothing, it is justifiable to believe it to be a specimen of either *R. simus* or *R. oswelli*; and as the habitat of the latter is distinctly circumscribed, the balance of evidence lies on the side of its having been the former. It may therefore be generally stated, subject to correction, that *R. simus* is common to the south of the Zambesi; and while undoubtedly it exists to the north of it, though not I think in large numbers, it has never been seen in any part of Northern Africa. It is, however, worthy of remembrance that the value of its horn in those parts of Africa where it is rare or not found is great; while to the south, where it is plentiful, the value is comparatively small.

R. keitloa is another well-recognized species; but for the sake of comparison with those killed in other parts of Africa I will mention the average measurements I have noted, and the peculiarities of structure.

	ft.	in.
Length from nose to base of tail, about	11	0
Height at the shoulder ...... about	5	0
Circumference.............. about	9	0
Average length of the anterior horn..	1	8
Average length of the posterior horn..	1	6

In some few cases the posterior horn is a trifle the longer, and in others 4 or 5 inches the shorter. The head is of the same type as that of *R. bicornis major* and *R. bicornis minor*; and the peculiar snout and long prehensile upper lip which characterizes these three species is more marked than in the former, while less so than in the latter. Its food is chiefly, if not solely, the young and tender shoots of various kinds of thorns. In disposition it is decidedly morose and ill-tempered; but it seldom charges without provocation. Its habitat is a very extended one, though it does not seem to be plentiful anywhere, more than two or three being seldom seen together, and then only at long intervals. I have found it from the Black Umfolosi river in Zululand up to the Limpopo, and the black crosses seen on the map now before us in the country south of the Zambesi show the approximate spots where, to my knowledge, it has been killed. Andersson seems to have met with it to the west; and it most undoubtedly exists in Abyssinia, specimens which I have examined from that country being now in the British Museum, and a very perfect one in the possession of Mr. Gerrard; while from the measurements of a pair of horns from a Rhinoceros cow killed by Sir Samuel Baker (the front horn 23 inches, the back 17¼ inches) I should be inclined to believe that it also must have been *R. keitloa*, 17¼ inches being an extremely unusual length for the posterior horn of any other species.

I will next speak of *R. oswelli*, about which, however, much remains to be learned. In conformation, habits, disposition, and food it in no way differs from *R. simus*, except in its horns. This singularity, as is well known, consists in the front horn, which is straight, and even in comparison with *R. simus* unusually long, pointing forward at an acute angle instead of standing erect from the snout, though this angle is very various in different animals, some possessing the peculiarity in the most modified form, while in others it is very marked. The red marks on the map show where I know it to have been met with or killed; and I have found specimens high up on the east coast, though not exhibiting their characteristic to any great degree. It is, however, by far the most local of any of the species, so much so as to induce me to believe that it is merely local variety, some bull or cow (probably the former) having either from injury or accident of birth possessed a horn similar to that which we now find among its descendants. The fact of the peculiarity varying so greatly in different individuals is, it seems to me, in favour of this view, and of the interbreeding of *R. simus* and *R. oswelli*; while it is worthy of note that Livingstone mentions having seen somewhere near the Zambesi a "black" Rhinoceros with a horn like that of *R. oswelli*—a statement which proves the possibility of the accidental occurrence of such a peculiarity as the interbreeding of *R. oswelli* and any of the species known as the "black" is too incredible to be taken into serious consideration. It is, however, not possible to settle this point until it can be proved whether *R. simus* and *R. oswellii* do or do not interbreed; and I may therefore pass on to the next species.

I may first observe that in using the word *R. bicornis* for this in common with the next species, I do so under correction, and for the reason that while unable to say with certainty which has been hitherto referred to by different travellers under that name, I think it very probable that both have been so, though they differ so greatly that I cannot but wonder at this being the case, and can only account for it by the fact, which I have myself noticed, that where the one species is rare the other is common, and *vice versâ*. I will commence by describing the larger of the two, the one known on the east as the Kulumane, and up to the Zambesi as the Common Black Rhinoceros. This animal does not, I am inclined to believe, on an average exceed *R. keitloa* in size, though I have killed individual specimens larger than any I have seen of the latter; it, however, differs from it in its horns, which, though following the conformation of *R. simus*, never attain to the same size. Their average length in bulls is about 18 inches for the anterior, and 8 inches for the posterior, the circumference of the base of the larger horn being about 18 inches; while in cows, which in all the species have longer and more slender horns, the front one measures 22 inches, and about 16 inches at the base, the back one being about 12 inches in length. It is also worthy of note that the length of the horn in all the black species seldom varies in adults more than 3 or 4 inches, while in both the white a difference of a foot may not uncommonly be found. I have already mentioned when speaking of *R. keitloa* that the species now under discussion possesses, though in a less marked degree, the peculiar snout and upper lip characteristic of the three "black" species; and this leads me to the cause of such a provision of nature. *R. bicornis minor* and *R. keitloa* live, so far as my experience goes, entirely on the leaves and branches of trees; and this remarkable lip acts much in the same manner as the trunk of an Elephant in drawing their food towards their mouths. *R. bicornis major*, however, though living partly (and I should say chiefly) on the same, also consumes, like *R. simus*, large quantities of grass; and therefore its snout possesses the characteristics of both. I have frequently seen them browsing on the grass; but the possession for a few days of a young calf of this species afforded me an unusually good opportunity of studying their habits and favourite food. Its mother had been killed on the banks of the Pongolo by one of my hunters; and the calf had, as is often the case, remained by the carcass during the following night, where we captured it next morning, and after considerable difficulty conveyed it to our camp. The bottom in which it was tethered contained abundance of the rich grass which forms the chief food of *R. simus*; but it did not eat much of it, though even on the first evening it consumed a large quantity of the young shoots and tender leaves of the thorn-branches provided for it, and seemed to be most fond of the hack, or waitabit thorn, turning over the other kinds with its snout and tasting them, and then passing them by to search for the former. On the second evening, however, I noticed it, after returning from water, commence to eat the surrounding grass; and though it did not show so great a relish for it as it did for the thorn-shoots, it ate it, both then and afterwards, in such large quantities as proved that it naturally forms a by no means inconsiderable portion of its food.

In disposition this species much resembles *R. keitloa*—neither often charging without provocation, though they will puff and snort and show a disposition to do so; and it may also be said to be the more gregarious as well as the most common, herds of from five to fifteen being sometimes seen in unusually favoured localities. It undoubtedly exists in all the country S.E. of the Zambesi, being especially plentiful in some parts of Zululand. Whether it or the species I shall next describe under the name of *R. bicornis minor* is the one spoken of by Andersson on the west, I am unable to say, as he gives no measurements, though the head and horns depicted in one of his plates resemble those of the latter. Travellers in Central and Northern Africa speak of *R. bicornis* as existing without giving any details by which it can be identified; and though, for reasons to be hereafter given, I imagine the smaller species is alluded to in Northern Africa, I cannot of course be in any way certain.

The distinctive characteristics of *R. bicornis minor* are very marked. Its average measurements are as follows:—

	ft.	in.
Length from nose to base of tail	10	4
Height at the shoulder about	4	6
Circumference about	8	0
Average length of the anterior horn	0	10
Average length of the posterior horn ..	0	5

Sometimes specimens are found with the front horn 13 or 14 inches in length, and the posterior in proportion; but they are uncommon. The head is smaller in proportion than that of any other species, while the upper lip protrudes to a greater degree, and the eye is unusually small. Its foot is also smaller in proportion to its body than that of any of the others. Its food is, as I have before said, solely the leaves and branches of thorns; and it is scarcely ever found out of thorn-jungle, though *R. bicornis major* is often found in other coverts. Its disposition is savage and morose to the very last degree. It continually attacks without other provocation than the mere sight of a human being affords; and it will follow the scent of the human foot for some distance. When seen without the observer's proximity being suspected, it is generally heard grumbling and grunting out its ill temper; and in following its spoor the furrows ploughed up in the ground, and which are more or less made by all the different species, are so common as, when the ground is too hard to enable more than a faint mark to be seen, to prove to the hunter the species he is following. I have never seen more than three (a bull, a cow, and a calf) together. I have found them in considerable numbers from the Black Umfolosi river in Zululand all along the Ubombo range up towards the Limpopo, though as they near that river they become scarce, and I only know of one instance of their being found near the Zambesi. I have, however, no doubt that they existed at one time all over the thorn-country south of the Zambesi, as oral traditions of their ferocity are common among the Dutch hunters; and no doubt their own ill-temper accounts for their being now partially extinct in that district, self-defence on the hunter's part having caused their destruction; while lower down to the south-eastward, where no doubt they were originally more common, they are disappearing more rapidly than any other species. I have seen a considerable number of horns from Abyssinia, and they appear to me to resemble in size and shape those of this species, though perhaps a trifle longer; but until some one will describe the animal to which they belong, it is useless to make guesses which are not founded on sufficient data.

It will be seen from the above remarks how very limited my knowledge of the subject under discussion really is; nor should I have ventured to make them before you this evening had I not felt that it is only by each traveller describing what has actually come within his own observation that such questions as the number of species of any animal on so large a continent as Africa can ultimately be set at rest; and this must be my excuse should you feel that from my slender acquaintance with my subject I have been to any extent occupying your time to-night under false pretences.

6. List of Birds met with in North-eastern Queensland, chiefly at Rockingham Bay. By E. PIERSON RAMSAY, C.M.Z.S.—Part II.*

[Received December 28, 1875.]

174. PTILINOPUS SWAINSONII †.

This species is somewhat rare in the Rockingham-Bay district; a few only were obtained.

175. LAMPROTRERON SUPERBUS.

I found this, one of our most beautiful species, tolerably abundant in all the scrub lands of the Herbert river and coast-range. Their note is a broken "coo," prolonged into a rolling guttural sound at the end; they may be heard at least half a mile off. But, owing to the dense nature of the scrubs, the birds are at all times difficult to obtain, although not rare. The female of this species has undoubtedly been described and figured under the name of *L. cyanovirens*. The young resemble those of *L. swainsonii*, particularly in having narrow yellow margins to the primaries and secondaries, and to the tips of the feathers on the chest and breast; they do not show the forked or split feathers on these parts before the end of the second year, although the green bands on the flanks are conspicuous in the nestling.

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* Continued from P. Z. S. 1875, p. 603.

† Where no references are given, the names are taken from Gould's 'Handbook.'

176. MEGALOPREPIA MAGNIFICA.

I found this species abundant, and very variable in size.

177. MEGALOPREPIA ASSIMILIS.

Although this bird is so much smaller than the preceding species in all its admeasurements, it should scarcely be considered a distinct species, as it differs in no other way except in size from *M. magnifica*. I have examined numerous examples of both *M. magnifica* and *M. assimilis*, and consider the latter rather the connecting link to *M. puella*. This last species has lately been noted from Cape York, whence I received a fine pair procured there by Mr. J. A. Thorpe.

178. LEUCOMELÆNA NORFOLCIENSIS.

We procured several specimens of this fine and scarce Pigeon. They were found feeding in the same trees (*Acmena* and *Jambosa*) with *Ptilinopus*, *Megaloprepia*, and others.

179. MYRISTICIVORA SPILORRHOA.

During the months from October until the end of April, when they leave, this species is very numerous all over the Rockingham-Bay district. Early in the morning, as soon as it is light enough, they leave their roosting-places in large flocks, and betake themselves to their feeding-grounds, dispersing over the scrubs and among the various species of *Acmena* and *Jambosa* which line the margins of the Herbert river. Towards evening they assemble, and, leaving the feeding-grounds, return to roost on the mangrove islands in Hinchenbrook channel, and around the coast and mouths of the rivers, flying a distance of often 40 miles night and morning. The tops of the mangroves on which they roost are literally white with birds; and, notwithstanding the disturbance and havock committed among them by shooting-parties, they continue to arrive until dark. They breed on these islands, building little or no nest, a few sticks placed so as to prevent the eggs from rolling away being considered sufficient. Young almost fully fledged were brought to me in January; but many at this time were laying their eggs. When freshly killed the concealed portions of the feathers on the body are of a beautiful delicate rosy salmon hue, which soon fades after death.

180. LOPHOLAIMUS ANTARCTICUS.

I once met with a flock flying over some of the dense scrubs of the Herbert river, and also a few on the wing near the township of

Cardwell. They were not considered plentiful in the district. Those obtained about Cape York are considerably less in size, and appear more plentiful in that district.

181. CHALCOPHAPS CHRYSOCHLORA.

This pretty Ground-Dove is tolerably plentiful over the whole district. I noticed it frequently close to residences and in gardens within the township.

182. LEUCOSARCIA PICATA.

This species is not by any means so plentiful as in the brushes of New South Wales, where the woods resound with its monotonous, deep, and melancholy call. It frequents alike the dry scrubs on the margins of rivers, and those which clothe the damp stony sides of the Sea-view range. Its flesh is highly esteemed, and resembles that of a Quail. The bird is strictly a ground-feeder, only taking to the trees when disturbed, where, perched on some thick branch, it remains motionless until apparently all danger is over. The eggs are two in number, of the usual form, but comparatively small.

183. PHAPS CHALCOPTERA.

We met with this bird rarely, and only on the sterile sandy flats in open forest country beyond the coast range, where numerous species of *Acacia* abound, on the seed of which they feed.

184. GEOPHAPS SCRIPTA.

Occasionally found in open forest-country. Met with only in one place, about 30 miles inland. I found it breeding in the Burnett-river district in December 1870. The nest was placed beside a tuft of grass, and consisted of a shallow hole lined with a few blades of dry grass. The eggs were two in number, and of a creamy white.

185. ERYTHRAUCHÆNA HUMERALIS.

186. GEOPELIA TRANQUILLA.

187. GEOPELIA PLACIDA.

I found these species by no means rare. They prefer the open country, and feed on the seeds of the "Grass-tree," *Xanthorrhœa*, and various species of *Acacia* and other leguminous plants abundant in the sandy tracts about Cardwell.

188. MACROPYGIA PHASIANELLA.

This fine species, so abundant in the "brushes" of the Richmond and Clarence rivers in New South Wales, is far from being common in the Herbert-river district; I met with a pair on one occasion only. It was quite an unknown species to most of the settlers in those parts.

189. TALEGALLUS LATHAMI.

However plentiful this species may have been formerly in the Rockingham-Bay district, it is now very scarce, only one having been obtained during my visit. They are still plentiful in the New-South-Wales scrubs. I found that two or more females visited the same mound to lay their eggs in; and when this is the case the mound is often twice as large as an ordinary mound. It seems probable that several individuals assist in scratching the mound together, when a space often 50 yards in diameter (on level ground) is found cleared of almost every fallen leaf and twig. The mounds are often 6 feet in height, and 12 to 14 wide at the base; sometimes they are more conical. The central portion consists of decayed leaves mixed with fine débris, the next of coarser and less rotted materials; and the outside is a mass of recently gathered leaves, sticks, and twigs not showing signs of decay. In opening the nest these are easily removed, and must be carefully pushed backwards over the sides, beginning at the top. Having cleared these, and obtained plenty of room, remove the semidecayed strata; and below it, where the fermentation has begun, in a mass of light fine leaf-mould will be found the eggs placed with the *thin end downwards*, often in a circle, with three or four in the centre, about 6 inches apart. At one side, where the eggs have been first laid, they will probably be found more or less incubated; but in the centre, where the eggs are placed last, quite fresh; and if only one pair of birds have laid in the mound, about twelve to eighteen eggs will be the complement, and will be found arranged as described above. On the other hand, if several females resort to the same nest, the regularity will be greatly interfered with, and two or three eggs in different stages of development will be found close to one another, some quite fresh, others within a few days of being hatched. There are usually ten eggs in the first layer, five or six in the second, three or four only in the centre. I found that the females return every second day to lay, but never succeeded in ascertaining which of the parent birds opens the nest. The aborigines informed me that the male bird always performs this office; and I usually found my black boys very correct in their statements of this kind. After robbing a nest it is necessary to replace the different layers as they are found; if the lowermost is too much mixed up with the others, or the top tumbled into the excavations made in the bottom one, the birds will invariably forsake the mound; so that I found it always necessary to carefully replace the different layers as I found them. It is not so with the *Megapodius tumulus*, which does not seem to care how much the mound is tumbled about, so that there is sufficient débris left to burrow in; and, indeed, should there not be, they quietly set to work and scratch it together again. The mounds of the *Tallegallus* are seldom found on a great incline when a level spot can be obtained. They frequently bring the débris from a considerable distance; and in one instance on the Richmond river I noticed a place where about a cartload had been scratched through a shallow part of a creek 3 or 4 inches deep in water, and up the other side of the bank to the mound, which was over 40 yards distant. The débris is *always thrown behind them.* The greatest number of eggs taken from one mound at one time was thirty-six. This was a very old mound, and resorted to by several individuals. The eggs vary much in size, and in shape from almost round to a long oval, or pointed at the thin end; their usual form is an oval slightly smaller at one end. The shell is very thin, minutely granulated, and snow-white in colour. They are of a very delicate flavour, resembling in taste those of the Plovers.

190. MEGAPODIUS TUMULUS.

This Mound-raiser is very plentiful north after passing Port Denison; I found it also in tolerable numbers as far south as the Pioneer river. They are strictly confined to the dense scrubs, and seldom, if ever, seen elsewhere. Their noisy cackling at night frequently disturbed us when encamped near one of their favourite resorts; and during the day their hoarse note at once betrays their presence. On the Herbert river they are not much sought after as an article of food either by the natives or whites; for as their eggs are esteemed a delicacy the birds themselves are not much molested. I examined several nests in March; and although it was not the regular breeding-season, yet fresh eggs were obtained, and newly hatched young were found singly here and there throughout the denser parts of the brushes. Some of the mounds were very ruthlessly destroyed by the whites, and scattered over the ground. This, however, did not cause the birds to forsake the place; and out of one large mound, which had been very roughly handled, two new ones were formed, about 10 yards apart, on the base of the old one, which was so matted and interlaced with roots from the neighbouring trees that it appeared to me a marvel how the birds could burrow into it the great length they did; and having once laid their eggs there, how ever the young birds found their way out through the maze of roots is still a mystery. Once out, however, and their wings dry, they are able to take care of themselves, but remain about the mounds for a day or so, as if waiting for some of their companions; but in less than a week from the day they are hatched they may frequently be seen at least a quarter of a mile away, and well able to fly about. I met one little fellow, only 5·5 inches in total length, fully a mile away from the nearest mound; he flew up and settled in a tree, about 20 feet from the ground. The wings and feet were remarkably developed for so small a bird, which could scarcely be more than four weeks old. Upon more than one occasion I have seen the birds busy at their mound, or feeding near it, but was never so fortunate as to meet with them in the act of burrowing. The largest mound I met with was about 50 feet in length, 10 in height, and 14 feet in width at the base, 8 or 10 on the summit. It seemed to be more like several mounds combined; and certainly more than two pairs of birds frequented it. While stationed gun in hand watching for Cassowaries (*Casuarius australis*), I noticed on one occasion five birds arrive at this mound in company; they came very close to me, making a chuckling noise jerked out from their throat, and not unlike that of a domestic fowl when driven from its nest, but not so loud. Usually only a pair are met with together. Their flight is heavy; and they do not readily take wing, unless pursued by a dog, when they rise with a considerable flapping to the most convenient branch, where they are easily approached and shot. Their flesh is dark, rank, and tough.

The young, about 5 inches in length, are of a dull brown, ashy brown on the sides of the face, neck, and mantle, and on the abdomen of a lighter ashy brown, rufous brown on the flanks, and brown washed with rufous on the breast; the back, rump, and tail of a rich rufous brown; primaries dark brown; interscapular region and upper wing-coverts dark brown, tipped with light rufous; the secondaries and scapulars freckled, and margined on the outer web with light rufous; the outer series of secondary-coverts and outer scapulars barred and freckled with the same colour; iris dark brown; feet yellow. Total length 5·5 inches, bill ·45, wing 4·5, tarsus 1 inch, tail a tuft of down about 1 inch in length.

191. Turnix varius.

192. Turnix pyrrhothorax.

193. Turnix velox.

I met with these three species occasionally. They were looked upon as scarce birds in the Herbert-river district. *T. varius* prefers the more open forest land; the other two I found on the margins of the open grass-flats, and in the vicinity of water-holes and lagoons &c.

194. Synoïcus australis.

195. Excalfactoria australis.

I found both species plentiful in the swampy parts of the grass-beds, and on grassy ridges generally throughout the district, and obtained young a few days old of *S. australis* in March.

196. Dromaius novæ-hollandiæ.

Emus were not plentiful, and so hunted that they are only found now in the unfrequented parts of the district. I met their tracks only on one occasion on the inland side of the range, in the basin drained by the Herbert river.

197. Casuarius australis.

One of the chief objects of my visit to Rockingham Bay was to become acquainted with the habits of this noble bird. In 1867 I had sent my collector, Edward Spalding, to this district for this purpose, but with very poor results. While in Brisbane on my way up I purchased by telegram a fine young living specimen, the first that had been obtained and reared, and ultimately succeeded in bringing it alive to Sydney and shipping it to the Society, where I am glad to hear it arrived safely*. I found also that several very young Cassowaries had been obtained, and, for the first time, a nest and eggs had been found. This was great news; and I need not relate how I made all haste to the Herbert-river Police Camp, where I was most hospitably entertained and welcomed by Inspector Johnstone, who was the first to rediscover and bring under the notice of others the existence of this remarkable species. I found Inspector Johnstone a true sportsman, as well as an ardent lover of Nature, a zealous and energetic naturalist, and a careful observer. I am indebted to this gentleman for much valuable information respecting the manners and customs of the aborigines, and notes on the habits of many birds and animals new to me, and especially for information on the present species.

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* See P. Z. S. 1875, p. 469.—Ed.

The Australian Cassowary is a denizen of the dense dark scrubs scattered over the district of Rockingham Bay, and extending as far north as the Endeavour river. It was tolerably plentiful only a few years ago even in the neighbourhood of Cardwell; but since the advent of sugar-planters &c. on the Herbert river and adjacent creeks, these fine birds have been most ruthlessly shot down and destroyed for the sake of their skins, several of which I saw used for hearth-rugs and door-mats. Formerly they were easily enough procured; but latterly so wary have they become, and their numbers so decreased, that it is only with the greatest amount of patience even a stray shot can be obtained. I know of no bird so wary and timid; and although their fresh tracks may be plentiful enough, and easily found in the soft mud on the sides of the creeks, or under their favourite feeding-trees, yet the birds themselves are seldom now seen. During the day they remain in the most dense parts of the scrubs, wandering about the sides of the watercourses and creeks, diving in through the bushes and vines at the slightest noise. Towards evening and early in the morning they usually visit their favourite feeding-trees, such as the native figs, Leichardt-tree (*S. leichardti*), and various species of *Acmena*, *Jambosa*, *Davidsonia*, &c.; they appear to be particularly fond of the astringent fruit of the Leichardt-trees and of a species of *Maranta*, which produced bunches of large seed-pods filled with juicy pulp, resembling in appearance the inside of a ripe passion-fruit (*Passiflora edulis*). Fruits and berries of all kinds are eagerly sought after; the tame semiadult bird which I had the pleasure of forwarding to the Society (1875) became so fond of the fruit of the Cape-Mulberry that he would allow no one to come near the tree he had taken possession of. This bird has frequently devoured at a time as much as 3 quarts of "Loquats" (fruit of *Eriobotria japonica*), and several fair-sized oranges *whole*, besides its usual amount of bread per diem (*about 3 pounds*). In nature, I found that in the afternoons they frequently came out and walked along the scrubs, or along the side of the river or creeks, and swallowed large quantities of pebbles and small rough-edged stones. In confinement, plantains and sweet potatoes (in large pieces, which they can swallow whole) are a favourite food, while nothing seems to come amiss to them—grasshoppers, spiders, earthworms, cockroaches, caterpillars of all kinds, dough, and even raw meat. They ascertain the flavour of their diet by first taking it up in the tip of their bill and giving it a slight pinch; and if not suitable, they throw it aside. I found they invariably refused *green Loquats*, but always picked them up in the bill first to try them. In confinement they become very tame, and may be allowed to walk about the place without restraint, coming when called, or more often running after and following any one who is accustomed to feed them. If disappointed or teased, they not unfrequently "show fight" by bristling up their feathers, and kicking out sideways or in front with force sufficient to knock a strong man down—a feat I have witnessed on more than one occasion. These birds are very powerful, and dangerous to approach when wounded. On more than one occasion a wounded bird has caused a naturalist to take to a tree; the sharp nail of the inner toe is a most dangerous weapon, quite equal to the claw of a large Kangaroo, and capable of doing quite as much execution.

I found the Cassowaries to be excellent swimmers, and frequently tracked them across a good-sized creek or river. On Hinchenbrook Island, situated about 1½ mile from the mainland, they have been frequently met with; and I have myself heard them calling at night and early in the morning as I passed up the channel, at a distance of at least 2 miles from them. Mr. Johnstone informs me he met with one swimming across a river of considerable width during his explorations while on the "North-east-Coast Exploring-Expedition." Their note, most usually emitted by the male, is a series of harsh guttural prolonged croakings quickly repeated, and continued for about 3 minutes; it is very loud, and may be detected across the water at a distance of at least 3 miles on a still night. I have listened to it resounding through the scrubs at a distance of 1½ mile on land, and then thought it close and one of the most unearthly noises I ever heard. They breed during the months of August and September. The first nest procured was found by some of Inspector Johnstone's black troopers, from whom Mr. Miller, a settler on the Herbert river, purchased some of the eggs. One which he kindly presented to me is of the *light-green* variety mentioned hereafter. The nest consists of a depression among the fallen leaves and débris with which the ground in the scrubs is covered, with the addition of a few more dry leaves. The place selected is always in the most dense part, and well concealed by entangled masses of vegetation. The eggs were five in number in the only two instances recorded; and in both cases one of the eggs in each set differed from the other, being of a light-green colour, and having a much smoother shell. The others all have a rough shell, covered rather sparingly with irregular raised patches of dark but bright green on a lighter-green and smooth ground. In the pale (No. 1) variety these raisings on the shell are closer together, and not so well developed; in both varieties they are more thinly spread over the central portion than at the ends. On the whole they closely resemble the eggs of *Casuarius bennettii*, in which similar variations are noticeable; but they are larger, and of a greater diameter, being greatest in the middle. I am indebted to Inspector Robert Johnstone for the fine series of the eggs of this species which at present grace my collection.

The following are measurements of some of the specimens of the eggs of both species:—

Casuarius australis.

		Length in inches.		Width in inches.
No. 1.	Light-green smooth shell..	5·33	×	3·73
No. 2.	Dark-green rough shell ...	5·3	×	3·88

Casuarius bennettii.

		Length in inches.		Width in inches.
No. 1.	Light-green smooth shell..	5·65	×	3·54
No. 2.	Light-green rough shell ..	5·32	×	3·31
No. 3.	Light-green rough shell ..	5·34	×	3·4
No. 4.	Dark-green rough shell....	5·2	×	3·32

The young of *Casuarius australis* are of a dull rusty brown, the feathers having frequently a blackish shaft-stripe, giving to the back a streaked appearance. After the first year the plumage takes a deeper lighter brown hue, and black feathers begin to appear mixed with brown, some being party-coloured. After the second season, at the age of 18 to 24 months, the black feathers predominate, and the helmet, which has hitherto been undeveloped, more like the shield of a coot (*Fulica*), begins to show a *keel* or *ridge* in *the centre*, which rapidly increases in height. The skin round the head, on which still remain a few brownish hair-like feathers, begins to become wrinkled and coloured, varying from bluish-green to orange on the lower part, and bright blue on the sides of the neck, the wattles becoming carmine. The helmet still remains comparatively small and undeveloped long after the wattles and naked parts of the neck become coloured. I believe that the helmet does not attain its full size until the fourth or fifth year at least. In traversing the scrubs the head is carried low to the ground, and the vines and branches of trees striking the helmet slide over it on to the back. Otherwise in the dense vine-scrubs bordering the Herbert river and elsewhere progress would be greatly impeded; but as it is, the Cassowaries traverse the scrubs with wonderful speed, jumping over fallen trees and logs when in the way. A young bird (the identical specimen, I believe, forwarded by his Excellency the Marquis of Normanby to the Society), while in the possession of Inspector Johnstone, during my visit succeeded in jumping out of its yard over a fence more than 6 feet in height. I measured the fence, and found it 6 feet 6 inches to the top rail, on which its feet-marks were plainly visible; the length of the yard was only 12 × 12 ft. I found the adult Cassowaries in full moult in March; but the new feathers had not all made their appearance in May. During these months specimens in confinement were remarkably irritable and frequently sulky, even refusing their food (which they invariably do when unwell), and were at times very spiteful, even attacking their keepers; but strangers chiefly come in for a share of their dislike. At all times I have noticed they are very fond of bathing; the semiadult bird before alluded to, which I forwarded to the Society, was remarkable

in this respect, and might frequently be seen waiting at the pump in in the yard until some one came for water, when he would sit down quietly under a copious shower, stretching out his neck and ruffling his feathers up to allow the water to reach the skin. They do not like any exposure, and always endeavour to get out of the sun. In the wild state they seldom leave the scrubs, and certainly never do so in the heat of the day unless hard pressed; but on the whole they are remarkably hardy, and bear confinement well. In February last (1875) I purchased four fine young birds about 6 months old, which were obtained from some settlers in the Herbert-river district; these also I forwarded to England during the same month.

7. Description d'un nouveau Cerf tacheté du pays d'Ussuri méridional, *Cervus dybowskii*. Par L. Taczanowski, C.M.Z.S.

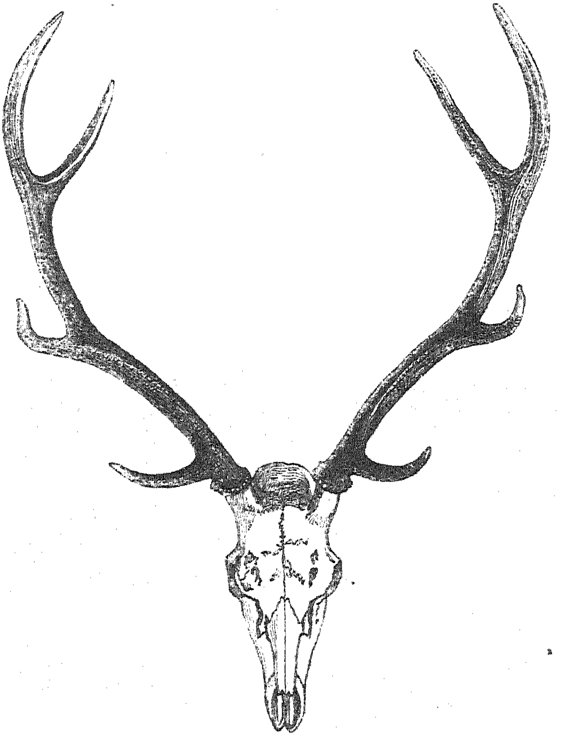
[Received December 17, 1875.]

En 1868, le Capitaine Przewalski a observé pour la première fois des cerfs tachetés dans ce pays, et dit dans son ouvrage imprimé en russe en 1870, que ces animaux abondent dans les grands forêts des côtes de la mer du Japon et de la région des affluents de l'Ussuri, en indiquant la rivière Tina pour limite septentrionale de la distribution de ce ruminant, de sorte qu'il n'en trouve point dans la région centrale du cours de l'Ussuri. M. Przewalski l'a nommé *C. axis*, Erxl. (?), et dit ensuite qu'il y a aussi dans ce pays un second cerf tacheté d'une taille intermédiaire entre le précédent et le cerf commun; et que sa peau d'été ne diffère en rien de celle de son *C. axis*, mais en hiver elle est d'un gris foncé, surtout au dos, où le poil est presque noir avec des taches blanchâtres à peine distinctes. Il a vu plusieurs fois des individus de cette espèce, sans pouvoir s'en procurer.

Le Dr. Dybowski vient de me fournir cinq peaux de ce cerf, parmi lesquelles il y a quatre mâles de différents âges (deux qui ont atteint le développement entier, un jeune à dagues simples, un d'âge intermédiaire) et une femelle. Ces cerfs me paraissent appartenir à cette dernière forme, celle plus forte du Cap. Przewalski, et tous ces exemplaires ont leur robe d'hiver. L'espèce paraît être inédite; je propose donc de le nommer *C. dybowskii*, en l'honneur de mon ami, zoologiste plein de mérite, dont le séjour de dix ans dans la Sibérie orientale a sensiblement augmenté les connaissances de la faune de ce pays, si curieux et si insuffisamment exploré en faits d'histoire naturelle.

Ce cerf est d'une taille plus forte que celle du daim (*C. dama*) et beaucoup plus petite que celle du cerf commun.

Les bois sont élevés et minces, moins penchés que ceux du *C. elaphus*, et moins recourbés sur les côtés, à trois andouillers simples, dont le basilaire et le suivant sont dirigés en avant un peu obliquement sur les côtés et légèrement courbés, et le troisième dirigé vers le milieu et très peu en arrière; ces embranchements sont médiocres, et presque égaux entre eux ; le prolongement du tronc principal est plus long que les branches précédentes, vertical, légèrement courbé vers le milieu. Le premier andouiller basal prend naissance beaucoup plus haut que celui du cerf commun (l'axe de cette branche est à 4 centim. de la couronne), le deuxième est plus éloigné du précédent que du troisième (19 et 17 centim.). Sur la face supérieure de la partie du tronc comprise entre les deux premiers andouillers se trouve une assez forte carène, et cette partie est considérablement plus haute que large ; l'anneau basal est étroit. La rugosité surtout dans la moitié basale est assez forte. Les appendices osseux servant de base aux bois sont très-élevés (5 centim.).



Skull and horns of *Cervus dybowskii*.

Le nez est nu ; les fosses lacrymales profondes. La crinière est abondante au cou et entre les épaules, et se prolonge d'une manière distincte jusqu'à la naissance de la queue ; tout le cou est garni de poils longs. La queue est beaucoup plus courte que dans le *C. axis*, garnie de longs poils, qui forment une touffe dépassant l'extrémité caudale de 22 centim.

La couleur générale des animaux adultes en pelage d'hiver ressemble à celle d'un chevreuil (*C. capreolus*) d'hiver, c'est-à-dire qu'elle est formée d'un semis d'une multitude de petites stries fauves sur un fond gris brunâtre; chaque poil est gris, rembruni vers le haut avec un large anneau fauve à une certaine distance du sommet, qui est noirâtre. Sur ce fond à couleur de chevreuil, il y a sur la partie postérieure du corps des taches blanchâtres, peu distinctes. Le fauve roussâtre prédomine sur les côtés du cou, tandis qu'en dessous le fond principal est brunâtre, varié de fauve. La crinière est rousse sur la nuque, ensuite elle devient brune variée de roussâtre; elle est distincte par une nuance beaucoup plus foncée dans toute la longueur du dos. Le museau est gris, piqueté de nombreuses stries fauves blanchâtres, cette couleur passe graduellement au roux sur le front; il y a une tache blanche, pure, cordiforme sur le devant du menton. La face dorsale des oreilles est roussâtre; l'interne est blanche ainsi que le bord externe de la face dorsale dans sa moitié inférieure. La queue est plus ou moins rousse en dessus avec un mélange d'un petit nombre de poils noirs, et blanche en dessous. Il y a aussi un espace blanc au pourtour des fesses, couvert par une grande tache caractéristique noire. Le ventre est gris brunâtre presque uniforme avec un peu de blanchâtre au milieu et du blanc pur dans la partie postérieure. Les jambes sont fauves roussâtres avec une large raie brune le long de la face antérieure, et une tache blanche arrondie sur le côté externe au-dessous du talon dans les jambes postérieures.

Le jeune mâle à dague simple et un autre à ce qu'il paraît de deux ou trois ans, sont en général plus roux sur un fond brun plus foncé; le roux prend un ton ferrugineux bien intense le long de la crinière dans toute la longueur du corps. Les taches blanchâtres sont beaucoup plus prononcées, mais elle paraissent être plus restreintes. La couleur roussâtre des jambes est plus vive, avec la raie dorsale brune plus foncée.

Dimensions:

	centim.
Hauteur des bois	58
Distance entre les bois à la base	9·5
„ „ extremités de la branche principale	43·5
Longueur du 1r andouiller	15
„ du 2e „	15·5
„ du 3e „	14·5
„ du sommet du tronc principal	24
„ de l'oreille	16
„ de la queue	12
„ „ avec la touffe	34
Jambe antérieure jusqu'au poing	38
Tarse	48

8. Revision of the Lepidopterous Genus *Teracolus*, with Descriptions of the new Species. By ARTHUR GARDINER BUTLER, F.L.S., F.Z.S.

[Received December 8, 1875.]

(Plates VI. & VII.)

The Butterflies treated of in the present paper, although admitted by all to be very pretty, are by no means favourite objects of study with the lepidopterist.

Whenever a genus is composed of striking and, at the same time, sharply defined species, plenty of entomologists are always ready to work at it; but when, as in the present instance, there is some difficulty in ascertaining the amount of variation obtaining in the different species, it will be found that lepidopterists are not unfrequently content to catalogue all doubtful forms as varieties of known species, often giving to the world a false view of their geographical distribution, and thus hindering instead of advancing science.

The genus *Teracolus* was first founded by Swainson, in his 'Zoological Illustrations,' for the reception of his *T. subfasciatus*. But a few years since I extended it for the reception of all the insects formerly constituting the genera *Idmais* and *Callosune*, there being no reason, but that afforded by colour, why they should ever have been kept separate.

Until quite recently I was unable, from lack of adequate material, to attempt a revision of this very difficult group; but the kindness of Mr. E. C. Buxton, in presenting to the Museum his valuable collection of African "Orange-tips," has at length put me into a fair position to work out the whole of the African species.

In order to make the present paper more complete, Mr. F. Moore has very generously lent me the whole of his Indian specimens, thus enabling me to avoid errors in determining the Asiatic species—our deficiencies in Syrian forms being also partially met by the assistance of my friend R. Meldola, who has put into my hands several species collected by the late Mr. J. K. Lord.

It would be easy to show that the present genus contains but few, if any, very sharply defined species. It is not improbable that, when we know the Butterflies of East Africa, Arabia, Syria, and Persia more thoroughly, we shall be able to show an unbroken gradation from one end of the group to the other. At present we get a nearly perfect transitional series from *T. subfasciatus* to *T. ione*, thence through *T. halimede* to *T. fausta*, *calais*, and allies, on the one hand, and to *T. eupompe* and allies on the other; from the latter we can run on, almost without a break, through *T. eucharis* to *T. interruptus*, and thence to *T. evippe*.

If the plan of "lumping" species were to be adopted in this genus, every year would probably decrease instead of adding to their number, until eventually we should be compelled to recognize but one species in the genus, a consummation certainly not to be desired. At present nobody doubts the existence of numerous species. Kirby's Catalogue, which gives what is styled "the broad view," inasmuch as it allows almost unlimited latitude for variation, enumerates 14 species under *Idmais*, 4 under *Teracolus*, and 53 under *Callosune*, 71 in all*. It being, therefore, impossible to be certain, without careful breeding from the egg, of the limits of any species in this genus, I have taken the only course open to me, and have described all the forms which seemed, in both sexes, to present constant distinctive characters, or which differed sufficiently, as single specimens, to warrant the belief that they were not varieties of known species.

1. *Wings sulphur-yellow or white, the apex of primaries dark, and traversed in both sexes by pale spots: wings of male below nearly uniform in tint, sometimes with a few black spots, of female more or less tinted with buff, the disk crossed by an irregular series of dark spots.* Teracolus, *Swainson.*

1 *a.* Wings of male uniformly yellow, apical patch of primaries black internally; apical spots confluent; wings below greenish white; apex of primaries and secondaries reticulated with pale greyish brown. *T. subfasciatus*, Swainson.

1. TERACOLUS SUBFASCIATUS.

Teracolus subfasciatus, Swainson, Zool. Ill. Ins. ii. pl. 115 (1823).

Anthocharis subfasciata, Boisduval, Sp. Gén. Lép. i. p. 567. n. 12 (1836).

Ptychopteryx bohemani, Wallengren, Lep. Rhop. Caffr. p. 18 (1857).

Damara Land (*Trimen*). B.M.

1 *b.* A black streak on inner margin of primaries, broad in the male, and uniting with a broad black outer marginal border. *T. eris*, Klug.

2. TERACOLUS ERIS.

Pontia eris, Klug, Symb. Phys. pl. 6. figs. 15, 16 (1829).

Pieris eris, Boisduval, Sp. Gén. Lép. i. p. 514. n. 111 (1836).

Anthocharis eris, Reiche, Ferret & Galinier, Voy. Abyss. Ent. p. 460, pl. 31. figs. 1–3 (1849).

Idmais eris, Kirby, Syn. Cat. p. 499. n. 12 (1871).

♂ ♀, Ambriz (*J. J. Monteiro*); ♂ ♀, S. Africa (*E. C. Buxton*). B.M.

The ground-colour of the wings of the female is either white, as in the male, or bright sulphur-yellow.

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* It should be observed that several species admitted in the above-mentioned Catalogue are referred by Mr. Kirby to *Pieris*.

1 *c.* No black streak on inner margin of primaries. *T. fatma.*

3. TERACOLUS FATMA.

Idmais fatma, Felder, Reise der Nov. Lep. ii. p. 189. n. 185, pl. 25. fig. 3 (1865).

Idmais eris, var., Kirby, Syn. Cat. p. 499. n. 12 (1871).

Kordofan.

This species is smaller than *T. eris*, has the external area of primaries tawny, the discal spots disconnected, and no marginal spots on secondaries. I have seen a specimen in Mr. Druce's collection.

4. TERACOLUS COLIAGENES.

Euchloë coliagenes, Butler, Ann. & Mag. Nat. Hist. ser. 3, vol. xx. p. 216, pl. 4. figs. 4, 5 (1867).

Callosune coliagenes, Kirby, Syn. Cat. p. 500. n. 4 (1871).

White Nile (*Petherick*). Type, B.M.

Precisely like the *T.-fausta* group in pattern, but of a sulphur-yellow colour.

2. *Wings sulphur-yellow, white, or pale ochreous; below with transverse bands across the disk of secondaries.*

2 *a.* Wings yellow, markings above much like the *T.-fausta* group.

5. TERACOLUS PROTOMEDIA.

Pontia protomedia, Klug, Symb. Phys. pl. 8. figs. 13, 14 (1829).

Pieris protomedia, Boisduval, Sp. Gén. Lép. i. p. 509. n. 105 (1836).

Teracolus protomedia, Kirby, Syn. Cat. p. 500. n. 4 (1871).

♂ ♀, White Nile (*Petherick*). B.M.

The plumule of this species is, as might be expected, like that of the other species of *Teracolus*.

6. TERACOLUS AMELIA.

Idmais amelia, Lucas, Rev. Zool. p. 427 (1852).

Senegal.

Allied to the preceding species.

2 *b.* Wings above pale ochreous and white.

7. TERACOLUS VELLEDA.

Idmais velleda, Lucas, Rev. Zool. p. 428 (1852).

Abyssinia.

Intermediate between *T. amelia* and *T. vesta*.

8. TERACOLUS VESTA.

Idmais vesta, Reiche, Ferret & Galinier, Voy. Abyss. p. 463, pl. 31. figs. 7, 8 (1849).

Caffraria (*Becker*), S. Africa (*E. C. Buxton*). B.M.

9. TERACOLUS HEWITSONII.

Idmais hewitsonii, Kirby, Syn. Cat. p. 498. n. 4 (1871).

Idmais chrysonome, Doubleday & Hewitson, Gen. Diurn. Lep. pl. 7. fig. 5 (1847).

Idmais vesta, Trimen, Rhop. Afr. Austr. i. p. 62. n. 41 (1862).

Congo (*A. Curror*). Type, B.M.

10. TERACOLUS CHRYSONOME.

Pontia chrysonome, Klug, Symb. Phys. pl. 7. figs. 9–11 (1829).

Idmais chrysonome, Boisduval, Sp. Gén. Lép. i. p. 585. n. 1 (1836).

Congo (*A. Curror*). B.M.

2*c*. Wings above white; primaries with large purplish crimson apical patch, crossed by a black line.

11. TERACOLUS PHOLOË.

Anthopsyche pholoë, Wallengren, Wien. ent. Monatschr. iv. p. 35. n. 6 (1860).

Callosune pholoë, Kirby, Syn. Cat. p. 504. n. 44 (1871).

Lake Ngami.

12. TERACOLUS AMINA.

Anthocharis amina, Hewitson, Exot. Butt. iii. Anth. pl. 1. figs. 1–3 (1866).

Callosune amina, Kirby, Syn. Cat. p. 500. n. 1 (1871).

Between Natal and Delagoa Bay (*E. C. Buxton*). B.M.

13. TERACOLUS CELIMENE.

Anthocharis celimene, Lucas, Rev. Zool. p. 426 (1852).

Callosune celimene, Kirby, Syn. Cat. p. 504. n. 48 (1871).

Abyssinia.

The three preceding species seem to be nearly allied; and since Hewitson gives the Zambesi as the locality of his type, I feel rather doubtful of their being all distinct.

3. *Wings of the male with purple apex, externally and sometimes internally bordered with black; females with white-spotted or orange tips; secondaries below generally with traces of a transverse oblique brown or blackish line, sometimes obsolete.*

3*a*. Primaries of male above without black internal limitation of the apical patch; secondaries above and below uniformly white: apical patch of female with a violet gloss.

14. TERACOLUS REGINA.

Anthocharis regina, Trimen, Trans. Ent. Soc. ser. 3, i. p. 520. n. 1 (1863).

Callosune regina, Kirby, Syn. Cat. p. 500. n. 7 (1871).

Damara Land. Type, B.M.

3*b*. Primaries of male with apical patch redder in tint and broader; secondaries with the veins slightly blackish, and terminating in well-marked black spots.

15. TERACOLUS HETÆRA.

♂, *Callosune hetæra*, Gerstaecker, in Van der Decken's Reisen in Ost-Afrika, p. 365. n. 7, taf. xv. fig. 2 (1873).

Endara.

This species is larger than *T. regina*, and in the marginal spots of secondaries approaches *T. ione* and allies.

3*c*. Primaries of male above without black internal limitation of the apical patch; secondaries black-veined; below whitish, with base of costa yellowish, black veins, and an oblique, ill-defined, dotted transverse line: female with apical patch of primaries orange, crossed by black spots; secondaries white, with marginal blackish spots; below pinkish ochraceous, with a well-marked, spotted, red-brown, angulated, oblique transverse streak.

16. TERACOLUS PHLEGYAS.

Anthocharis phlegyas, Butler, P. Z. S. 1865, p. 431, pl. 25. figs. 3, 3*a* (1865).

Callosune phlegyas, Kirby, Syn. Cat. p. 500. n. 5 (1871).

White Nile (*Petherick*). Type, B.M.

It is possible that this may be the species represented by Reiche (Ferret & Gal. Voy. Abyss. pl. 30) as a variety of *A. ione*; only it is there represented with a black internal limitation of the apical patch, and with no trace of a cross bar on the under surface of the secondaries.

3*d*. Like the preceding, excepting that the violet apical patch of the male and the orange patch of the female are both larger; secondaries of male below whitish, with base of costa indistinctly ochraceous, veins below not black: female with outer limitation of apical patch almost obliterated by the orange colouring, the black spots small; secondaries white, with the marginal spots small; below very pale brown with the apical area and a well-marked discocellular spot white; the brown area reticulated with slightly darker hatchings, and limited by an oblique whity-brown streak (not angulated). *T. buxtoni.*

17. TERACOLUS BUXTONI.

Teracolus buxtoni, n. sp., supra.

♂ ♀, Between Natal and Delagoa Bay (*E. C. Buxton*). Type, B.M.

This is probably the South-African representative of *T. phlegyas*.

3*e*. Size of the preceding two species; violet apical patch of the male bordered on both sides with black; secondaries below and apex of primaries with a distinct pink tinge; costa of secondaries yellowish towards base; a well-marked oblique brown streak: apical patch of female above black, spotted with white; base dusky; apex below sordid yellowish, crossed by black-and-white spots; secondaries sordid yellowish, reticulated with grey; a black-and-white spot at end of cell; base of costa yellowish; an oblique brown streak as in the male.

18. TERACOLUS JOBINA.

♂ ♀, *Euchloë jobina*, Butler, Cist. Ent. i. p. 14. n. 2 (1869).
Callosune jobina, Kirby, Syst. Cat. p. 504. n. 49 (1871).
♂, *Teracolus jobina*, Butler, Lep. Exot. pl. xliii. fig. 3 (1872).
♂ ♀, Natal (*E. C. Buxton*). B.M

The violet patch contains from five to six divisions: in the type in Mr. Druce's collection there are five, the two upper ones being very minute, and all of them being distinctly separated; one example of the three males presented by Mr. Buxton has six divisions, separated only by the black nervures.

3*f*. Violet apical patch of the male bordered on both sides with black; internal vein and apical two thirds of remaining veins beyond cell of primaries black; basal area and internal two fifths of secondaries dusted with grey; internal area of primaries tinted with sulphur yellow; secondaries with black veins, terminating in black marginal spots: below, the apex of primaries and the secondaries tinted with pink, the latter with an oblique *dotted* line (composed of four to five small brown spots); base of costa ochraceous. Female with the apical patch orange, bordered with black and crossed by black spots, or black crossed by five white spots: secondaries below pinkish grey or yellowish, reticulated with pale brown, crossed by an oblique brown streak, and with brown outer borders; base of costa sometimes ochreous.

19. TERACOLUS JALONE.

♂, *Euchloë jalone*, Butler, Cist. Ent. i. p. 14. n. 1 (1869).
Callosune jalone, Kirby, Syn. Cat. p. 500. n. 6 (1871).
Teracolus jalone (part.), Butler, Lep. Exot. p. 116 (1872).
Anthocaris ione (sic), Lucas, Lep. Exot. pl. 37. fig. 4 (1835).
♂ ♀, *Anthocharis ione*, Hopffer in Peters's Reise n. Mossamb. Zool. v. p. 357, pl. 21. figs. 1–6 (1862).
♂, White Nile, Coll. Druce, E. Africa? B.M.

The characters of the females are taken from Hopffer's figures.

3*g*. Nearly allied to the preceding; violet apical patch of male much larger, more broadly black-bordered; internal vein and apical half of remaining veins beyond cell of primaries, and all the veins of secondaries, black; basal third of primaries and base of secondaries dusted with black, black marginal spots; apical area of primaries and whole of secondaries below cream-coloured; primaries with black dot at end of cell, a black squamose spot on the margin of the apical area within the lower discoidal interspace, and two marginal spots terminating the first and second median branches; secondaries with the base of costa orange; a black discocellar dot; a broad oblique black bar, interrupted by the nervures from costa to third median, a spot on second median interspace, a dot on first median, and a spot on interno-median interspace, all black. Female with the apical patch orange, bordered with black, and crossed by a broad lunulated black band, or black spotted with yellow; secondaries below either pinkish grey, with a broad, tapering, oblique brown streak, or yellow with a subangulated macular black streak (as in the male); with costa orange, and outer border broadly brown. *T. imperator.*

20. TERACOLUS IMPERATOR.

Anthocharis ione, Reiche, in Ferret & Galinier, Voy. Abyss. pl. 30. figs. 1, 2, 5–7 (1849).

Callosune ione (part.), Kirby, Syn. Cat. p. 500 (1871).

Teracolus jobina (part.), Butler, Lep. Exot. p. 116 (1872).

♂, Senegal (*E. C. Buxton*). Type, B.M.

3*h*. Violet apical patch of male very widely bordered with black; internal vein of primaries white, remaining veins partly black; base densely dusted with grey; veins of secondaries frequently black, but not so distinctly as in the two preceding forms, with terminal black spots; apex of primaries and the whole of secondaries below cream-coloured, with veins dusky; nervures terminating in black dots; black discocellular dots; secondaries below with a black subcostal spot (not a transverse bar). Female with the apical patch orange, bordered with black and crossed by black spots, or black with three decreasing white spots; secondaries below lemon-yellow, partially reticulated with brown, crossed by an oblique brown streak, and two brown spots on first median and interno-median interspaces; discocellular spots well marked.

21. TERACOLUS IONE.

Pieris ione, Godart, Enc. Méth. ix. p. 140. n. 74 (1819).

Anthocharis ione (part.), Boisduval, Sp. Gén. Lép. i. p. 515 (1836).

Callosune ione (part.), Kirby, Syn. Cat. p. 500. n. 3 (1871).

Anthocharis erone, Angas, Kaffirs Illustrated, pl. 30. fig. 3 (1849).

Var. *Anthopsyche speciosa*, Wallengren, Kongl. Svenska Vetensk. Akad. Handl. p. 16 (1857).

♂ ♀, Natal (*Becker, Argent, Burrows, E. C. Buxton*). B.M.

A small male, agreeing with Wallengren's description, is amongst the specimens presented by Mr. Buxton.

3 *i*. Violet patch of the male only represented by two spots; under surface of secondaries yellow.

22. TERACOLUS EUNOMA.

Pieris eunoma, Hopffer, Ber. Verh. Ak. Berl. p. 640. n. 2 (1855);

Peters, Reise n. Mossamb. Zool. v. p. 353, pl. 23. figs. 1, 2 (1862).

Mozambique.

4. *Wings of male above uniformly sulphur-yellow, with the apex of primaries and a spot at end of cell black; secondaries below yellow, with an interrupted oblique black streak: female pale sulphur-yellow, almost white, with the outer margins broadly black; a black discocellular spot in primaries; secondaries below lemon-yellow, with an angulated black streak.*

23. TERACOLUS MANANHARI.

Pieris mananhari, Ward, Ent. Mo. Mag. vi. p. 224 (1870); Afr. Lep. pl. ii. figs. 1–4 (1873).

Teracolus mananhari, Kirby, Syn. Cat. p. 500. n. 2 (1871).

Madagascar.

This extraordinary species is clearly related to the *T. ione* group, but it is very dissimilar from all the species in the genus.

5. *Wings white, more or less clouded with orange; primaries of the males with grey apical border and black veins.*

5 *a*. Wings of male grey at base; orange area restricted and pale.

24. TERACOLUS HALIMEDE.

Pontia halimede, Klug, Symb. Phys. pl. 7. figs. 12–15 (1829).

Pieris halimede, Boisduval, Sp. Gén. Lép. i. p. 526. n. 129 (1836).

Idmais halimede, Kirby, Syn. Cat. p. 499. n. 13 (1871).

Anthocharis leo, Butler, Ann. Nat. Hist. ser. 3, vol. xvi. p. 397 (1865).

White Nile (*Petherick*). B.M

5 *b*. Wings of male almost entirely covered with deep orange.

25. TERACOLUS PLEIONE.

Pontia pleione, Klug, Symb. Phys. pl. 8. figs. 7, 8 (1829).

Terias pleione, Boisduval, Sp. Gén. Lép. i. p. 672. n. 33 (1836)

Idmais pleione, Kirby, Syn. Cat. p. 499. n. 14 (1871).

Idmais miriam, Felder, Reise der Nov. Lep. ser. 2, p. 190. n. 186 pl. 27. figs. 3, 4 (1865).

Teracolus chrysomela, Butler, Cist. Ent. p. 244 (1874).

White Nile (*Petherick*). B.M.

This species is much deeper in colour than Klug represents it to be in his figure; its affinities seem about equally balanced between the two groups, of which *T. fausta* and *T. eupompe* may be considered as typical, the male nearly resembling the former, the female more closely approaching the latter.

The succeeding six species, constituting my Section 6, might perhaps be separated generically from *Teracolus*, inasmuch as the males have an embossed spot on the internal area of primaries near the base; they could not constitute the genus *Idmais* even in a restricted sense, inasmuch as Boisduval indicates *I. calais* as his type, thus:—

"Nous avions donné primitivement à ce genre le nom de *Calais*, en prenant comme générique le nom de l'espèce la plus connue; mais comme ce changement de nom spécifique en nom générique n'est pas sans inconvénients, nous lui avons substitué celui d'*Idmais*."

For my part I see little utility in distinguishing a group so manifestly intermediate between the *T. halimede* and *Calais* groups, more especially since the structural distinction is confined to one sex.

6. *Wings entirely orange or white above, with black discocellular spots in primaries, and a maculated black border, expanding in primaries towards the costa, and more or less enclosing a series of orange or white spots.*

26. TERACOLUS FAUSTA.

Papilio fausta, Olivier, Voy. dans l'Emp. Oth., L'Egypte et la Perse, Atlas, pl. 33. figs. 4 *a*, *b* (1801).

Pieris fausta, Godart, Enc. Méth. ix. p. 132. n. 41 (1819).

Pontia fausta, Klug, Symb. Phys. pl. 8. figs. 9–12 (1829).

Idmais fausta, Boisduval, Sp. Gén. Lép. i. p. 586. n. 2 (1836).

♂ ♀, Baghdad (*W. K. Loftus*). B.M.

Mr. Moore has this species from N.W. India.

27. TERACOLUS FAUSTINA.

Idmais faustina, Felder, Reise der Nov. Lep. ii. p. 190. n. 187, (1865).

——?

The colouring of the underside differs from any thing that I have seen; the spots on the disk being lutescent or orange.

28. TERACOLUS ROSACEUS, n. sp. (Plate VII. fig. 6.)

♂. Wings above precisely like dark females of *T. fausta*, excepting that the secondaries have a white patch above the subcostal nervure, and the marginal black spots are linear: wings below pale creamy yellow; primaries with the discocellular spot small, lunate, black, with light centre; apical border rosy, bounded within by six ill-defined spots of the ground-colour, limited by an inner series of decreasing spots, the upper four rusty, the lower two minute and black; secondaries with a pale-centred buff discocellular spot; seven discal spots in a J-shaped series, the first brown, the remainder buff-coloured; outer border rosy; body below creamy-white. Expanse of wings 1 inch 9 lines.

Akote. Type, coll. F. Moore.

The succeeding species is nearly allied, but seems to me to be distinct.

29. TERACOLUS ORIENS, n. sp. (Plate VII. fig. 7.)

♂. Wings above precisely like dark females of *T. fausta*, excepting that the secondaries have a white patch above the subcostal nervure: wings below pale yellowish white, slightly rosy towards the base; primaries with the discocellular spot small, elliptical, black, with white centre; apical border pale reddish-orange, bounded within by six ill-defined yellowish spots, limited by an inner series of seven decreasing spots, the upper five rusty-brown, the lower two black; secondaries with a pale-centred rusty discocellular spot; seven discal spots in an irregular arched series, all rusty; outer border pale reddish orange, diffused internally; body below creamy-white. Expanse of wings 1 inch 8 lines.

♀. Altogether paler; primaries with the costa and base cinereous; discocellular spot small, as in the male; apical border dark brown, enclosing six spots internally and seven externally; secondaries with six large subquadrate marginal dark brown spots: wings below creamy sulphur-yellow, rather darker towards the base and on the outer margins; otherwise as in the male. Expanse of wings 2 inches.

♂, Kalka, foot of Himalayas (*Boys*, B.M.). ♀, Kattywar (coll. Moore).

30. TERACOLUS SOLARIS, n. sp.

♂. Wings above like dark females of *T. fausta*, but altogether of a deeper orange-colour, with the costa of primaries ash-coloured, and the discocellular spot much larger; secondaries with a white patch above subcostal: wings below pale creamy yellow, deeper towards the base, the markings as in the preceding species. Expanse of wings 2 inches 2 lines.

♂ var. Wings above paler in tint; ash-coloured costa of primaries darker; markings below rather paler. Expanse of wings 1 inch 1½ lines.

♂, Scinde? (B.M.); ♂ var., N.W. India (coll. F. Moore).

Wallace labelled this as his *Idmais fulvia*; but it is quite distinct.

31. TERACOLUS FULVIA.

♂, *Idmais fulvia*, Wallace, Trans. Ent. Soc. ser. 3, vol. iv. p. 392. n. 5, pl. 9. fig. 5 (1867).

Idmais tripuncta, Butler, Proc. Zool. Soc. p. 221, pl. 17. fig. 9 (1868).

♂ ♀, N. W. India. Type, coll. Moore.

The female is white instead of orange.

7. *Closely allied to the preceding group; wings pale salmon-colour or white above, with broad black-brown outer borders, intersected by spots of the ground-colour; wings below coloured much as in* Colias. Idmais, *Boisd. Type* I. calais.

32. TERACOLUS VESTALIS, n. sp. (Plate VII. fig. 10.)

♂ ♀. Size of the preceding group of species: white above, with a broad irregular external black border; two white spots placed obliquely below the apex of primaries, and a third much larger on second median interspace; a large black spot at the end of the cell;

the subcostal area, discoidal cell (excepting its inferior angle), and the base of interno-median area black-brown, somewhat diffused in the male: wings below sulphur-yellow, the male with the internal area of primaries white, the female with the disk white; the male slightly tinted on outer border of primaries, and over the whole of secondaries, with ochraceous; minute marginal black dots at the terminations of the nervures; primaries with a large black spot, with a squamose yellow centre at end of cell; three black spots near outer margin, below the median branches; secondaries with a blackish subapical costal spot; a minute blackish annular dot at end of cell; outer border of upperside visible through the wing; entire wing sprinkled with black scales. Expanse of wings, ♂ 2 inches, ♀ 1 inch 11 lines.

♂, Scinde (*Le Mesurier*); ♀, Agra, N.W. Punjab. Coll. Moore.

33. TERACOLUS PUELLARIS, n. sp.

♂ ♀. Allied to the preceding, but considerably smaller; outer border in the male narrower; basal area of primaries and base of secondaries grey, irrorated with brown: wings below sulphur-yellow, the internal area white; black spots near outer margin of primaries placed more irregularly, the lower of the three extending downwards and expanding upon the inner margin; subapical costal spot of secondaries ill-defined. Expanse of wings, ♂ 1 inch 5 lines, ♀ 1 inch 6 lines.

♂, Punjab, Wuzeerabad (*Hearsay*, B.M.).; ♀, Scinde (coll. F. Moore).

This may possibly be a dwarfed form of the preceding species; but I think not.

34. TERACOLUS OCHREIPENNIS, n. sp.

♂ ♀. Above like the preceding species, white, with black irregular outer border, marked in the primaries with three white spots, black discocellular spot, and grey base: below, however, it differs in having the primaries with the outer border pale ochreous; secondaries entirely pale ochreous or buff. Expanse of wings, ♂ 1 inch 4 to 5 lines, ♀ 1 inch 6 to 8 lines.

♂, India; ♂ ♀, Punjab; ♀, Scinde; ♀ var., N. India.

Colls. Moore and B.M.

The three preceding species have been considered by some Lepidopterists females of n. 37, which has been confounded with the *Phisadia* of Godart.

35. TERACOLUS PHISADIA.

♂. *Pieris phisadia*, Godart, Enc. Méth. ix. p. 132. n. 40 (1819).
Idmais phisadia, Boisduval, Sp. Gén. Lép. i. p. 587. n. 3 (1836).
♂ ♀. *Pontia arne*, Klug, Symb. Phys. pl. 7. figs. 1–4 (1829).
♂. *Idmais arne*, Boisduval, Sp. Gén. Lép. i. pl. 19. fig. 2 (1836).

Senegal. B.M

This species has the primaries pale pinkish salmon-colour, and the secondaries white; the female is, according to Klug's figure, yellow.

36. Teracolus zoë.

Anthocharis zoë, Grandidier, Rev. Zool. p. 272 (1867).
Callosune zoë, Kirby, Syn. Cat. p. 504. n. 51 (1871).
Madagascar.

This species seems to me to be closely allied to the preceding; Kirby, however, refers it to *Callosune*, whilst he places *T. phisadia* in the genus *Idmais*.

I am pleased to find a typical *Idmais* described as an *Anthocharis* by a man who, inasmuch as he worked but little at the Lepidoptera, was obliged, when he did so, to examine into their structure, because it is a confirmation of my own conviction that *Idmais* does not differ *structurally* from the group *Callosune*, hitherto regarded as a distinct genus by many Lepidopterists.

37. Teracolus protractus, n. sp.

♂ ♀. Wings above rosy salmon-colour, the base, costa of primaries, abdominal area of secondaries, and five to seven decreasing spots on the outer border of primaries ashen-grey; a broad black-brown outer border, paler, and occupying nearly half the wing in the secondaries of the female: wings below sordid pale buff; primaries with the base of costa and cell sulphur-yellow; outer border greyish, owing to the semitransparency of the wing; a black spot at end of cell, and three below median branches, the lowest one bifid; secondaries with the external area greyish, as in the primaries. Expanse of wings, ♂ 1 inch 8 to 9 lines, ♀ 1 inch 7 to 9 lines.

♂, Punjab (coll. B.M.); ♀, Punjab (coll. F. Moore).

38. Teracolus modestus, n. sp.

♂. Very like *T. amata*, pale pinky salmon-colour, grey at base; the outer border broadly black-brown, upon primaries very feebly sinuated internally between the median branches, barely enclosing a spot of the ground-colour on interno-median interspace, and marked by an oblique slightly inarched series of three subapical points of the same colour, upon secondaries bordered internally by four minute points of the ground-colour, limited by black dots and surrounded with grey; costal area black-brown, broader in the male than the female, and on the primaries dusted in front with grey: wings of the male below yellow as in *T. amata*, with similar markings, but the spots at end of cells very minute and ill-defined: the female, which is paler above than the male, is slightly tinted with grey below; two or three extremely ill-defined ochreous spots beyond the cell of primaries and bounding the usual pale yellow spots of the disk; fringe feebly pink; secondaries with a discal series of five ochreous spots, and a pale-centred ochraceous discocellular spot. Expanse of wings 1 inch 7 lines, ♀ 1 inch 5 lines.

Ceylon (*Templeton*). ♂ ♀, type, B.M.

A white variety of the female occurs, not differing on the under surface.

39. TERACOLUS AMATA.

Papilio amata, Fabricius, Syst. Ent. p. 476. n. 143 (1775).

Idmais amata, Butler, Fabr. Cat. p. 217. n. 1 (1869).

Papilio calais (part), Cramer, Pap. Exot. iv. pl. 351, A–D (1782), bad figures.

♂ ♀, Kurnool; ♂ ♀, Balasore; ♂, Bombay; ♀, Madras; ♂, Deccan; ♀, Coromandel. Colls. F. Moore and B.M.

The last two of the examples quoted above are in the Museum collection: the species is the size of *T. calais* (the female sometimes larger); it is much like *T. dynamene*; but the outline of the marginal border is much less irregular, and the colouring of the underside clear, the female only showing more or less strongly defined transverse discal spots. A white female from Kurnool is in Mr. Moore's collection; it has the markings of the underside better defined than usual in the typical female.

40. TERACOLUS CYPRÆA.

Papilio cypræa, Fabricius, Ent. Syst. iii. p. 203. n. 634 (1793).

♂ ♀, Bombay (8 examples). Coll. F. Moore.

This species is considerably larger than *T. calais*, the figure of which Fabricius quotes for it; the male measures 1 inch 8 lines to 2 inches 1 line, and the female 1 inch 11 lines to 2 inches 2 lines. It is easily distinguished from *T. calais* on the underside by the absence of the orange spot on disk of primaries, and by its deeper coloration; from the preceding species *T. amata* it is easily distinguished by its more elongated primaries, deeper coloration below, and the more irregular outer border of the primaries, the enclosed spot on interno-median interspace being much broader.

There is a white female in the collection of the British Museum; it is smaller than typical females, and the ground-colour on the under surface is paler.

41. TERACOLUS DYNAMENE.

Pontia dynamene, Klug, Symb. Phys. pl. 6 figs. 15, 16 (1829).

Idmais dynamene, Boisduval, Sp. Gén. Lép. i. p. 588. n. 5 (1836).

♂, N. India (B.M.); ♂ ♀, Scinde and Agra; ♂, Kattywur; ♀, Punjab (coll. F. Moore).

This species is frequently confounded with *T. amata* in collections. It is, however characterized by a much less rounded outer margin to the primaries, paler and more greyish coloration, the abdominal half of secondaries distinctly grey in the male, the inner edge of the external border of primaries more irregular even than in *T. cypræa*, the greener coloration of the under surface, the paler female, which has a distinct orange blotch (cut by the median nervure and its first two branches) on the under surface of the primaries, as in *T. calais*, and in the greater prominence of the pale marginal internervular lituræ on the upper surface.

42. TERACOLUS CARNIFER, n. sp. (Plate VII. figs. 8, 9.)

♂. Allied to the preceding species, but smaller, and of a clearer and brighter colour, the costa of primaries, base, and abdominal area of secondaries much less strongly suffused with grey; the black discocellular spot of primaries more conical in shape; the outer blackish border terminating abruptly upon the first median branch, the margin alone being black; the black spot on interno-median area smaller and not connected with the outer border; six discal spots of the ground-colour running in a curved series through the centre of the border, the first four large, placed in pairs, the last two small and well separated; six submarginal smaller spots, the two at apex elongated; secondaries with five large diamond-shaped brown spots at the end of the nervures, the upper three united into an apical marginal band; the last of these spots ill-defined on a grey ground at end of second median branch; the first median and internal nervures also terminate in diamond-shaped grey spots; three small black spots on the disk, above the median nervures; costal area, excepting at apex, broadly black: wings below nearly as in *T. dynamene*, but clearer in colour, with a suffused orange patch over the median nervure. Expanse of wings 1 inch 5 lines.

Mynpuri, N.W. Punjab. Type, coll. F. Moore.

43. TERACOLUS CALAIS.

Papilio calais, Cramer, Pap. Exot. i. pl. 53. figs. C, D (1779).
Idmais calais, Trimen, Rhop. Afr. Austr. p. 61. n. 40 (1862).

Congo (*Curror*). B.M.

This species is of the size and form of *T. amata*, but can readily be distinguished by the orange patch below, which is more strongly developed than in any other species; the female has the disk and external spots of the primaries and the whole of the ground-colour of secondaries whitish. Cramer confounded the African species with the insect from Coromandel, which he figured under the same name in his fourth volume.

8. *Wings white or sulphur-yellow, spotted or banded above with black or grey, the apex of primaries invariably orange in the males, generally black in the females with a central orange, yellow, or white macular band; this band, however, is occasionally absent, leaving the apex wholly black.* Callosune, *Doubleday*.

8 *a*. Orange apical patch of the male without an internal black edge, interrupted internally on second median interspace by a transverse black spot. Typical form, *T. interruptus*.

44. TERACOLUS SUBFUMOSUS, n. sp. (Plate VI. fig. 3.)

♂. Very like *T. interruptus*, but with no internal blackish streak on the primaries, with the black outer border of the orange patch narrower, the inner spot small; the inferior extremity of the orange patch not enclosed by a black expansion of the border; secondaries with the marginal spots small: primaries below white, the apical area clay-coloured speckled with grey and bordered internally by a dull orange diffused streak; secondaries pale buff, densely irrorated with grey, the upper half of discoidal cell, the lower half of discoidal interspace, and the centres of the interspaces thence to the costa whitish; nervures terminating in minute black points; costa and apical half of outer margin ochraceous. Expanse of wings 1 inch 6 lines.

♀. Sulphur-yellow or white, base dusky; primaries with a more or less defined (but always pale) grey internal streak; a black point at end of cell; outer margin broadly black, dentate-hastate internally; immediately beyond and touching the points of the denticles an oblique angulated black band (the two sometimes barely distinguishable owing to the expansion of the black points); the spots left between the border and the band and a narrow streak inside the latter orange or sulphur-yellow; secondaries with a series of triangular marginal black spots, a blackish subapical costal spot, and a badly-defined W-shaped marking cut by the third median branch; wings below more deeply coloured than in the male; the cell of primaries tinted with sulphur-yellow; otherwise the same. Expanse of wings 1 inch 4–5 lines.

N.E. of Natal (12 examples, *E. C. Buxton*). Type, B.M.

45. Teracolus lycoris, n. sp. (Plate VI. fig. 6.)

♂. Wings above as in the preceding species; secondaries below sandy whitish, irrorated with grey-brown; a black-and-orange dot at end of cell; a congregation of brown atoms on subcostal interspace near apex, and another on the disk, cut by the third median branch. Expanse of wings 1 inch 5 lines.

♀. Wings above white; base grey; primaries with a more or less defined but always pale grey internal streak, ending in a blackish spot; a black dot at end of cell; apex broadly black, crossed by an ill-defined series of minute squamose orange spots; inner edge of apical patch sometimes bordered with sulphur-yellow; secondaries with a more or less strongly defined series of marginal black spots, the three next to apex largest and sometimes united; a black subapical costal spot, and a larger spot on discoidal interspace, sometimes throwing off a smaller diffused blackish spot on each side: primaries below white, showing the discocellular dot and internal spot of upper surface; apex clay-coloured or sandy, irrorated with grey, and bordered within by an oblique series of four black or brown spots; secondaries clay-coloured or sandy, irrorated with grey; a black spot or black-and-orange point at end of cell; and an angulated series of black or brown discal spots. Expanse of wings 1 inch 4–5 lines.

Between Natal and Delagoa Bay (4 examples, *E. C. Buxton*). Type, B.M.

This is the *Anthopsyche eucharis* of Wallengren, but not of Fabricius.

46. Teracolus flaminia, n. sp. (Plate VI. fig. 1.)

♂. Like *T. subfumosus* above, but the primaries with a more or less defined dusky spot on interno-median interspace, sometimes connected by a greyish internal streak with the base; secondaries with the marginal spots occasionally larger, and a dusky ill-defined spot on the second median interspace: primaries below with the apical area dull lemon-yellow, bounded internally by an angulated brown line, followed by and edging a broad orange streak; secondaries sandy whitish, irrorated sparsely with brown, a congregation of brown scales on the costa near apex, and an ill-defined streak across the median branches; costa at base orange, a black and orange point at end of cell. Expanse of wings 1 inch 4–7 lines.

♀. Sulphur-yellow above, base slightly greyish, internal area of primaries grey, darkest at base and in a spot beyond the middle, where it terminates; outer margin bordered by brown triangular connected spots, the apices of the nervures also brown; a narrow angulated discal brown streak halfway between the cell and apex; a minute black point at end of cell; secondaries with a marginal series of brown spots, a lunular subapical spot on subcostal interspace; a squamose brown discal streak across the median branches: wings below with the base of primaries yellow and the secondaries slightly darker; otherwise as in the male. Expanse of wings 1 inch 3 lines.

Between Natal and Delagoa Bay (4 examples, *E. C. Buxton*).

Type, B.M.

This is a well-marked little species, easily distinguished by the coloration of the under surface.

47. TERACOLUS LYÆUS, n. sp. (Plate VI. fig. 2.)

♂. Wings above white, base greyish black, base of costa, head, palpi, and prothorax pinkish; centre of costa of primaries markedly black; apex orange, sharply cut, with lilacine reflections; outer border to first median branch black, strongly sinuated between the veins, whose apices are also black; a well-defined rounded black spot, touching the third median branch, upon the second median interspace; fringe, excepting at external angle, rosy; an ill-defined internal pale grey streak, slightly darker at its extremity; secondaries with a marginal series of black spots, more or less triangular; fringe rosy at anal angle: primaries below with the apical area chrome-yellow, irrorated with grey and cut by an angulated orange streak; fringe and costa as above; secondaries rosy, irrorated with grey; a dusky subapical spot, and a second on second median interspace; an orange-and-black discocellular point; costa deep orange. Expanse of wings 1 inch 4 lines.

♀. White above, with the apex of primaries yellow and the costa rosy; base yellow, irrorated with grey; primaries with apical markings, as in the preceding species, but broader; a greyish ill-defined internal streak, terminating in a brown spot; secondaries with a marginal series of large brown spots, a brown subapical spot, and a W-shaped discal marking cut by the third median branch: wings below as in the male, but rather paler. Expanse of wings 1 inch 4 lines.

Between Natal and Delagoa Bay (3 examples, *E. C. Buxton*).

Type, B.M.

48. TERACOLUS FRIGA, n. sp. (Plate VI. fig. 5.)

♂, ♀. White above, the female slightly tinted with sulphur-yellow towards the base; base blackish grey; primaries with the apex orange; costa of the male broadly black in the centre; outer margin black, dentate-hastate, the apices of the nervures black, male with the usual black spot on the orange, the female with the angulated black streak; a black internal spot indicating the termination of a greyish streak (dimly visible in the female only); secondaries with a marginal series of conical black spots united in the female; an ill-defined W-shaped marking touching the third marginal spot: primaries below white; a black dot at end of cell; apex in the male broadly dull reddish, becoming greyish externally and crossed by a scarcely visible angulated grey streak; costa and apex of the female ochreous, irrorated with grey; a subapical angulated brown streak; base and subcostal area sulphur-yellow; secondaries of the male sordid white, irrorated with blackish; the costa deep orange; two subapical ochreous spots; an orange-bordered black dot at end of cell; secondaries of the female sandy, becoming whitish towards the centre, densely irrorated with purplish brown; two subapical brown spots; costa orange; a black-and-orange dot at end of cell. Expanse of wings ♂ 1 inch 5 lines, ♀ 1 inch 4 lines.

N.E. of Natal (*E. C. Buxton*). Type, B.M.

49. TERACOLUS GALATHINUS, n. sp.

♂. Above like *T. interruptus*, excepting that there is a submarginal zigzag grey streak from the radial to the internal nervure of secondaries: primaries below white; a black discocellular point; apical area reddish orange, with a subapical diffused yellow spot; fringe rosy; secondaries rosy, irrorated with brown; a subapical brown spot, and a discal brown streak across the median branches; costa deep orange; a black-and-orange dot at end of cell. Expanse of wings 1 inch 6 lines.

♀. White, with the subapical and subbasal areas yellow, base grey; primaries with the costa and fringe rosy; a black discocellular spot; a broad blackish internal streak terminating in a black spot; apex broadly black, sometimes crossed by a curved series of cuneiform yellow spots; secondaries with a marginal series of conical black spots; an irregular discal black streak; apex yellowish: primaries below white, the basal and costal areas sulphur-yellow: a black point at end of cell; apical area clay-coloured, reddish externally, and bounded within by a brown angulated streak bordered with dull reddish orange; secondaries as in the male, but darker. Expanse of wings 1 inch 4 lines.

N.E. of Natal (1 ♂, 6 ♀, *E. C. Buxton*). Type, B.M.

50. TERACOLUS INTERRUPTUS.

♂, ♀ *Teracolus interruptus*, Butler, P. Z. S. p. 724 (1871); Lep. Exot. p. 115, pl. xliii. figs. 1, 2 (1872).

♂ ♀, Loanda (*coll. R. Meldola*); ♂, Angola (*E. C. Buxton*). B.M.

I have compared our example with male specimens given to me by Mr. Ansell, from Kinsembo, and find no difference.

51. Teracolus lucullus. (Plate VI. fig. 4.)

♂. Above very like the preceding species, but the internal streak of primaries more defined, the base and costa of secondaries blackish, terminating near apex in a black costal spot; marginal spots of secondaries more distinctly separated: wings below white, primaries with the apical area sulphur-yellow, covered internally by a broad orange patch (not so broad as in *T. interruptus*), through the centre of which runs an angulated grey streak; a black point at end of cell; a blackish spot on internal area; secondaries tinted with pale sulphur-yellow at apex; basal half of costa orange, a blackish subapical costal spot; a black-and-orange dot at end of cell; an angulated brown marking on the disk, cut by the third median branch; a marginal series of black dots terminating the nervures. Expanse of wings 1 inch 5 lines.

♀, *Teracolus loandicus* (in part), Butler, P. Z. S. p. 724 (1871); Lep. Exot. p. 91, pl. xxxiv. fig. 9 (1872).

♂, Ambriz, October 1872 (*J. J. Monteiro, B.M.*); ♀, Loanda (*coll. R. Meldola*).

I have no doubt that I made a mistake in referring the above female to my *T. loandicus*, the differences between it and the female of *T. interruptus* being precisely parallel to the differences between the two males. *T. loandicus* will come into another section, in which the females have the marginal spots of secondaries rather small, the orange patch of primaries curved and not extending beyond the limiting streak, and an interrupted angular streak from costa to internal area of secondaries.

52. Teracolus gelasinus, n. sp.

♂. Nearly allied to *T. interruptus*, but readily distinguished by the absence of the internal streak of primaries and the small marginal spots of secondaries: wings below white, the nervures terminating in black dots, all the wings with black dots at the end of the cells; primaries with the apex broadly sulphur-yellow, bounded internally by a rather narrow orange band, on which are a few dusky scales; sometimes a small dusky spot near inner margin beyond the middle; secondaries speckled with brown, with the basal third of costa orange, sometimes a small dusky spot on second median interspace. Expanse of wings 1 inch 4–7 lines.

♂. Quanza, August 1872; ♂, Ambriz, October 1872 (*J. J. Monteiro*). Type, B.M.

53. Teracolus antigone.

Anthocharis antigone, Boisduval, Sp. Gén. Lép. i. p. 572. n. 19 (1836).

Callosune antigone, Kirby, Syn. Cat. p. 502. n. 21 (1871).

Anthocharis phlegetonia, Boisduval, Sp. Gén. Lép. i. p. 576. n. 25 (1836).

Callosune phlegetonia, Kirby, Syn. Cat. p. 503. n. 30 (1871).

West Africa. B.M.

The *Anthocharis phlegetonia* of Wallengren and the *A. achina* of Lucas are distinct species.

54. TERACOLUS EIONE.

Anthocharis eione, Boisduval, Sp. Gén. Lép. i. p. 578. n. 29 (1836).

Callosune eione, Kirby, Syn. Cat. p. 503. n. 35 (1871).

Var. *Anthopsyche phlegetonia*, Wallengren, Lep. Rhop. Caffr. p. 13 (1857).

♂ ♀, S. Africa (*E. C. Buxton*); ♀, Zoolu (*Sir A. Smith*). B.M.

55. TERACOLUS STYGIA.

Anthopsyche stygia, Felder, Reise der Nov. Lep. ii. p. 188. n. 183 (1865).

Callosune stygia, Kirby, Syn. Cat. p. 503. n. 31 (1871).

Bogos.

Allied to *T. eione*.

56. TERACOLUS ISAURA.

Anthocharis isaura, Lucas, Rev. Zool. p. 424 (1852).

Callosune isaura, Kirby, Syn. Cat. p. 503. n. 38 (1871).

Abyssinia.

57. TERACOLUS DALILA.

Anthopsyche dalila, Felder, Reise der Nov. Lep. ii. p. 188. n. 184 ("1865").

Callosune dalila, Kirby, Syn. Cat. p. 503. n. 32 (1871).

Bogos.

58. TERACOLUS DAIRA.

♂ ♀, *Pontia daira*, Klug, Symb. Phys. pl. 8. figs. 1–4 (1829).

Anthocharis daira, Boisduval, Sp. Gén. Lép. i. p. 579. n. 30 (1836).

Callosune daira, Kirby, Syn. Cat. p. 503. n. 34 (1871).

♂ ♀, White Nile (*Petherick*). B.M.

8 *b*. Orange apical patch with or without a black edge, but not interrupted internally in the male by black spots.

59. TERACOLUS GLYCERA, n. sp.

♂. Wings above white, with an oblique slightly incurved orange apical patch on primaries; centre of costa and outer margin black, the latter dentate-sinuate; a greyish internal streak terminating in a blackish spot; secondaries with the base and costal area near apex grey; a marginal series of triangular black spots, and, touching them, a submarginal grey streak: wings below white; primaries with the discoidal cell bright sulphur-yellow, a black dot at the end of it; apex pale lemon-yellow, bounded internally by an orange streak; a dusky spot on internal area; secondaries with the base of costa orange; a black-and-orange dot at end of cell; a dusky streak across the median branches. Expanse of wings 1 inch 6 lines.

Africa? Type, coll. B.M.

60. Teracolus pallene.

Anthocharis pallene, Hopffer, Ber. Verh. Ak. Berl. p. 640. n. 4 (1855); Peters's Reise n. Mossamb. Zool. v. p. 358, pl. 23. figs. 7, 8 (1862).

Callosune pallene, Kirby, Syn. Cat. p. 504. n. 50 (1871).

Mozambique.

61. Teracolus nouna.

Anthocharis nouna, Lucas, Expl. Alg. Zool. iii. p. 350. n. 14, pl. 1. fig. 2 (1849).

Callosune nouna, Kirby, Syn. Cat. p. 503. n. 39 (1871).

Algeria.

62. Teracolus liagore.

Pontia liagore, Klug, Symb. Phys. pl. 6. figs. 5–8 (1829).

Anthocharis liagore, Boisduval, Sp. Gén. Lép. i. p. 580. n. 33 (1836).

Callosune liagore, Kirby, Syn. Cat. p. 503. n. 42 (1871).

Arabia.

63. Teracolus ephyia.

Pontia ephyia, Klug, Symb. Phys. pl. 6. figs. 9, 10 (1829).

Anthocharis ephyia, Boisduval, Sp. Gén. Lép. i. p. 580. n. 32 (1836).

Callosune ephyia, Kirby, Syn. Cat. p. 503. n. 40 (1871).

Arabia.

64. Teracolus lais, n. sp.

♂. Like the preceding species, but whiter, the orange patch o primaries much more oblique and consequently shorter, not extending below the third median branch, but bordered internally by a broader blackish band; primaries with a well-defined discocellular spot: below, the secondaries have a black-and-orange dot at end of cell, the base of costa orange; the black irrorations scattered all over the wing, Expanse of wings 1 inch 4 lines.

Orange River, S. Africa. Type, B.M.

65. Teracolus halyattes, n. sp. (Plate VI. fig. 8.)

♂. Wings above white, primaries with an orange apical patch, more or less excavated internally, enclosed by a black border, and crossed by blackish veins; base blackish; a more or less defined black dot at end of cell; secondaries with small black spots terminating the veins, base blackish: primaries below with the costa rosy brownish; the apical area dull sandy ochraceous, irrorated with brown; a black dot at end of cell; secondaries sandy with a rosy tinge, irrorated with brown; a squamose subapical costal spot, and an ill-defined streak across the median branches, brown; base of costa orange, a black-and-orange dot at end of cell. Expanse of wings 1 inch 2–5 lines.

♀. White or sulphur-yellow above, base grey; primaries with the costa rosy, an internal grey streak, terminating at second third of wing in a transverse irregular blackish litura, which almost meets a spur from the apical area; the latter black, deeply notched internally, enclosing an oblique series of spots, four or five in number, orange, yellow, or white; the inner edge of the apical border bounded with orange in the orange-spotted form, and with an orange tint in the yellow-spotted form: secondaries with the cell and basal half of the interno-median and first median interspaces grey; a more or less defined angulated discal black streak thence to the costa; a marginal series of tolerably large black spots. Primaries below white or pale yellow, the bases broadly sulphur-yellow; apical area sandy or yellowish ochraceous, irrorated with brown and bounded by a pale orange or bright yellow nebulous streak enclosing a macular brown streak; a bisinuate brown litura, cut by the first median branch; a black dot at end of cell: secondaries as in the male, excepting that the subapical spot and discal streak are united into an angulated bar. Expanse of wings 1 inch 5–8 lines.

N.E. of Natal (*E. C. Buxton*). Type, B.M.

66. TERACOLUS ITHONUS, n. sp. (Plate VI. fig. 7.)

♂. Wings above white, blackish at base: primaries with a large triangular reddish-orange apical patch, not excavated, but notched internally, a few brown scales along its inner border; apical portion of costa and outer margin to first median nervule black; the marginal border dentate-sinuate, and throwing off long spurs along the nervures, but not completely separating the apical patch; a minute black dot at end of cell: secondaries with a series of six black marginal dots. Primaries below white, the apical area lemon-yellow, irrorated with grey; a black dot at end of cell: secondaries sandy whitish, strongly reticulated with brown; a black dot at end of cell; base of costa orange. Expanse of wings 1 inch 9 lines.

♀. Very like the females of the preceding species, but with all the black portions of the wing much less pronounced, the grey internal streak of primaries pale and ending in a distinct dark spot (not in an irregular transverse litura); the apical spots larger; the undersides of secondaries more evidently brown-speckled. Expanse of wings 1 inch 5–8 lines.

N.E. of Natal (4 examples, *E. C. Buxton*). Type, B.M.

67. TERACOLUS HARMONIDES, n. sp.

♂. Like a small example of the preceding species above, but the marginal dots of secondaries still smaller: primaries below with the apical area sandy reticulated with grey, with pale rosy borders, and an oblique inner transverse grey line composed of three grey spots: secondaries rosy whitish reticulated with grey; a black dot at end of cell; the base of costa orange. Expanse of wings 1 inch 6 lines.

♀. White above, the base greyish; primaries with the costa greyish, black towards apex; apical area orange; outer border rather broadly black, deeply sinuated internally, extending to first median nervule; a subapical oblique irregular black streak, united to the outer border by black lines on the nervures (thus producing five subapical spots, the second minute); a black dot at end of cell; a grey internal streak terminating in a blackish spot: secondaries with the abdominal area greyish; six decreasing greyish-brown marginal spots, very large at apex; a dusky subcostal spot towards apex; a dusky oblique irregular marking on the disk and touching the third and fourth marginal spots. Primaries below white, the base pale yellowish; a black dot at end of cell; a grey internal line, terminating in a large black spot; apical area sandy, speckled with brown, becoming orange internally, and crossed by three grey spots: secondaries whity-brown, reticulated with brown; a black dot at end of cell; costa tinted with orange at base. Expanse of wings 1 inch 5 lines.

Between Natal and Delagoa Bay (*E. C. Buxton*). Type, B.M.

68. TERACOLUS HIPPOCRENE, n. sp.

♂. Also like *T. ithonus* above, but the marginal spots of secondaries larger and the base more heavily blackened: primaries below white, the apical area lemon-yellow, becoming paler externally; a black dot at end of cell: secondaries creamy white; the veins brownish; abdominal half of the wings speckled with brown; base of costa bright golden orange; a black-and-orange dot at end of cell. Expanse of wings 1 inch 6 lines.

♀. White, the apical area stramineous, with the black and grey markings as in *T. ithonus*, excepting that the internal grey streak is narrower: secondaries with basal and abdominal areas greyish; a marginal series of grey spots; an ill-defined W-shaped marking on the disk, cut by the third median branch. Wings below white: primaries with a black dot at end of cell; apex creamy yellowish speckled with brown, stramineous externally, and crossed obliquely by four brown spots: secondaries creamy, speckled with brown hatchings, which congregate as spots on the costa near apex and upon the centre of the disk; a black dot at end of cell. Expanse of wings 1 inch 7 lines.

Between Natal and Delagoa Bay (*E. C. Buxton*). Type, B.M.

69. TERACOLUS IGNIFER, n. sp.

♂. Wings above white, the base blackish: primaries with the apical half of costa and the outer margin to first median branch black, the apical fork of the subcostal, external two fifths of the radials, half the third median, external third of the second median, and apex of the first median nervule black; apical area broadly deep orange (almost vermilion), its internal edge bordered indistinctly by black atoms; a black dot at end of cell: secondaries with the apices of the nervures black, a marginal series of grey spots terminating the nervures. Primaries below white; apical area creamy orange, becoming clear and bright internally, crossed obliquely by a few brown scales, and speckled with brown towards apex: secondaries creamy whitish, with a feeble pink tint, densely reticulated, excepting just beyond the cell, with brown; a black-and-orange dot at end of cell, base of costa orange. Expanse of wings 2 inches.

♀. Very like the female of *T. halyattes*, but much larger, the apical spots of primaries above larger, the secondaries below with a clear patch beyond end of cell, as in the male. Expanse of wings 1 inch 9 lines.

Var. ♂. Apical area of primaries below uniformly pinkish; the secondaries also much more pink. Female with the internal streak of primaries above expanded into a broad irregular blackish patch. Expanse of wings, ♂ 1 inch 8 lines to 2 inches, ♀ 1 inch 9 lines.

♂, Zoolu (*Sir A. Smith*); ♂ ♀, S. Africa (12 specimens, *E. C. Buxton*). Type, B.M.

This is probably Trimen's *Anthocharis antevippe*, but not Boisduval's.

70. Teracolus castus.

♂. *Callosune casta*, Gerstaecker, Van der Decken's Reisen in Ost-Afrika, 3. Abth. ii. p. 365. n. 6, pl. xv. figs. 1, 1*a* (1873).

Lake "Jipe," E. Africa.

Allied to *T. deidamia*.

71. Teracolus simplex, n. sp.

♂. Wings above white: primaries with a very oblique triangular orange apical patch, bordered narrowly on its costal and external edges with pale brown; a minute black dot at end of cell. Primaries below white, with the apical area ochraceous, indistinctly speckled with brown; a black dot at end of cell: secondaries pale rosy whitish, reticulated with reddish brown; base of costa reddish; a pale-yellow-and-black dot at end of cell; a few brown atoms congregated below the costa near apex. Expanse of wings 1 inch 10 lines.

D'Urban (*Capt. Shelley*). Type, B.M.

This species is readily distinguished by the absence of grey scaling at the base, the indistinctness of the outer border of the primaries, and the very oblique inner edge of the orange apical patch.

72. Teracolus deidamia.

Anthopsyche deidamia, Wallengren, Wien. ent. Monatschr. iv. p. 35. n. 7 (1860).

Callosune deidamia, Kirby, Syn. Cat. p. 503. n. 41 (1871).

♂, 2 examples, Zoolu (*Sir A. Smith*). B.M.

73. TERACOLUS ZERA.

Anthocharis zera, Lucas, Rev. Zool. p. 423 (1852).
Callosune zera, Kirby, Syn. Cat. p. 502. n. 20 (1871).
Abyssinia.

Closely allied to *T. antevippe*, but the orange apical patch with a black internal margin.

74. TERACOLUS ANTEVIPPE.

Anthocharis antevippe, Boisduval, Sp. Gén. Lép. i. p. 572. n. 18, pl. 18. fig. 3 (1836).

♂ ♀, White Nile (*Petherick*), ♂, Senegal. B.M.

75. TERACOLUS HELLE.

♂. Nearly allied to *T. antevippe*, but the base of primaries broadly grey; outer black border of primaries twice the width; costa, excepting at base, distinctly black; orange patch of primaries below more restricted: terminations of veins in secondaries less distinctly black. Expanse of wing 1 inch 11 lines.

♀. Primaries rounded at apex; basal area of wings considerably darker than in *T. antevippe*, marginal spots of secondaries larger: primaries below with the transverse grey subapical streak almost obsolete; secondaries considerably whiter. Expanse of wings 1 inch 8 lines.

White Nile (*Petherick*). Type, B.M.

Possibly a variety of *T. antevippe*, but quite distinct in appearance. Until all these species have been bred, it will be necessary to regard all the dissimilar and apparently constant forms as different species.

76. TERACOLUS HYPERIDES.

Allied to *T. antevippe*; the male, however, differs in the narrow, squamose, black, internal edging to the orange-patch, and in the presence of a grey internal streak in primaries; the nervures of secondaries on underside not noticeably black-tipped; the orange of costa confined to the base, and the spot at end of cell smaller. The female also has the apical area of primaries distinctly orange, with a broad brown patch covering the base of discoidal cell and extending to beyond second third of internal area; the abdominal area of secondaries brownish, the angulated band more distinct: wings below altogether paler; primaries with a greyish internal streak, terminating in a large black spot; secondaries yellow instead of orange-tinted; the veins not black, angulated band less distinct. Expanse of wings ♂ 1 inch 9 lines, ♀ 1 inch 8 lines.

N.E. of Natal (3 specimens, *E. C. Buxton*). Type, B.M.

77. TERACOLUS ACHINE.

♀. *Papilio achine*, Cramer, Pap. Exot. iv. pl. 338. figs. E, F (1782).
Pieris achine? Godart, Enc. Méth. ix. p. 122. n. 14 (1819).
S. Africa (4 examples, *E. C. Buxton*). B.M.

The male differs from the *T. achine* of Hübner in having the veins of secondaries below black and no marking on the disk; the female is altogether more heavily coloured.

78. TERACOLUS EVENINUS.

♀. *Anthopsyche evenina*, Wallengren, Lep. Rhop. Caffr. p. 12 (1857).

Anthocharis evenina, Trimen, Rhop. Afr. Austr. p. 322. n. 216 (1866).

Callosune evenina, Trimen, Trans. Ent. Soc. p. 380, pl. 6. fig. 11 (1870).

Orange River, S. Africa (*Janson*); S. Africa (*E. C. Buxton*). B.M.

Males referred to *T. eveninus* in Mr. Druce's Collection do not differ in character from the other males of this group.

79. TERACOLUS TRIMENI, n. sp.

♂ ♀. *Aphrodite achine*, Hübner, Samml. exot. Schmett. ii. pl. 128. figs. 1–4 (1816–36).

♀ var. Apex of primaries black, crossed by five white spots, the angulated band of secondaries approaching at its angle nearer to the outer margin than in Hübner's figure.

♂ ♀, S. Africa (*E. C. Buxton*); ♂, Zoolu, Knysna, and Plettenberg Bay. Type, B.M.

This species has the wings of the male below white, the veins not being blackened as in *T. achine*. We have five males and two females (both of the albino variety).

80. TERACOLUS GAVISA.

Anthopsyche gavisa, Wallengren, Lep. Rhop. Caffr. p. 323 (1857).

Anthocharis gavisa, Trimen, Rhop. Afr. Austr. p. 324. n. 218 (1866).

Callosune gavisa, Kirby, Syn. Cat. p. 502. n. 18 (1871).

♂ ♀, *Anthocharis* ——? Angas, Kaff. Ill. pl. 30. figs. 4 and 5 (1849).

♀, *Anthocharis exole* (part), Reiche, Ferr. Gal. Voy. Abyss. Ent. p. 460, pl. 31. figs. 5 and 6 (1849).

♂ ♀, *Anthocharis achine*, Trimen (nec Cramer), Rhop. Afr. Austr. p. 46. n. 29 (1866).

Anthopsyche roxane, Felder, Reise der Nov. Lep. ii. p. 187. n. 182 ("1865").

♂ ♀, S. Africa (7 examples, *E. C. Buxton*); ♀, Natal. B.M.

This species is larger than *T. achine*. The male below differs in having a distinct, subapical, diffused, orange spot in primaries, and the secondaries more varied with orange, with the veins black to the base. The female has a broader orange patch above, and the underside more yellow in tint.

81. TERACOLUS HERO, n. sp. (Plate VI. fig. 12.)

♂. Allied to the preceding species, but larger, the vermilion patch at apex not bordered within with black, but with a few marginal blackish scales; the black veins only crossing its outer area; the internal black streak replaced by a tapering dark grey streak, which disappears just beyond the middle of the internal nervure; marginal spots clearly defined and well separated; secondaries below with the veins white from the base to the middle of the wing and thence grey to the margin. Expanse of wings 2 inches 1 line.

♀. Pale testaceous, the apical spots of primaries stramineous; brown parts of the wing as in *T. gavisa* ♀, excepting that the subapical band of primaries bounding the apical spots is not irregular externally, and is of more than twice the width; the spot at end of cell is lost in the brown basal patch, and the spots towards anal angle of secondaries are almost lost in the broad marginal border: below the wings are testaceous, the base and apex of primaries and the secondaries with a yellow tint and clouded with pale orange; the veins of external third of primaries are dusky, but on secondaries they are uniform with the ground-colour; the subapical, blackish, oblique streak of primaries is placed much nearer to the apex. Expanse of wings 1 inch 11 lines.

S. Africa (*E. C. Buxton*). Type, B.M.

I believe the above to be sexes; they have much in common.

82. TERACOLUS OMPHALOIDES, n. sp.

Anthocharis achine, Boisduval (nec Cramer), Sp. Gén. Lép. i. p. 574. n. 21 (1836).

This species differs from *T. omphale* in the narrower, black internal stripe of primaries, the obsolete character or absence of the male transverse stripe in the secondaries, and the red tint of the under surface of the latter wings. Expanse of wings, ♂ 1 inch 4–10 lines, ♀ 1 inch 5–10 lines.

♂ ♀, S. Africa (11 examples, *E. C. Buxton*); ♂, Zoolu (*Sir A. Smith*). Type, B.M.

If it were not for the number of examples which we now possess of this form, I should have been disposed to look upon it as a sport of *T. omphale*.

83. TERACOLUS OMPHALE.

Pieris omphale, Godart, Enc. Méth. ix. p. 122. n. 12 (1819).

Anthochaais omphale, Boisduval, Sp. Gén. Lép. i. p. 574. n. 22 (1836).

Callosune omphale, Kirby, Syn. Cat. p. 502. n. 23 (1871).

Anthocharis eurygone ?, Lucas, Rev. Zool. p. 341 (1852).

Callosune eurygone, Kirby, Syn. Cat. p. 502. n. 19 (1871).

♂ ♀, N.E. of Natal (13 examples, *E. C. Buxton*). B.M.

The undersurface of the secondaries in this species is of a greenish white colour, with the usual angular streak and discoidal spot.

84. TERACOLUS EXOLE.

♂. *Anthocharis exole* (part), Reiche, Ferr. Gal. Voy. Abyss. Ent. p. 460, pl. 31. fig. 4 (1849).

Callosune exole, Kirby, Syn. Cat. p. 503. n. 27 (1871).

♀. *Anthocharis achine*, Lucas (nec Cramer), Lep. Exot. pl. 37. fig. 2 (1835).

Anthopsyche acte, Felder, Reise der Nov. Lep. ii. p. 187. n. 181 ("1865").

♂, Knysna (*Trimen*) ; ♀, S. Africa (*E. C. Buxton*) ; Natal and Caffraria. B.M.

Wallengren, in his 'Lep. Rhop. Caffr.,' has confounded this species with *T. omphale*; the two females are much alike. M. Lucas's figure is not quite correctly drawn and is over-coloured ; but there is no mistaking the species intended.

85. TERACOLUS SUFFUSUS, n. sp. (Plate VI. fig. 10.)

♀. Very like a small female of *T. omphale*, but the basal area of the primaries grey to costa, the subapical orange spots smaller, and the angular band of secondaries considerably narrower: wings below creamy white ; secondaries with a distinct yellowish tint; primaries with a large, subapical curved, orange patch, leaving a narrow, sordid, yellow, apical border; secondaries with an angulated discal streak (its upper half ill defined) testaceous ; a black-and-orange spot at end of cell. Expanse of wings 1 inch 4 lines.

Ambriz (*J. J. Monteiro*). Type, B.M.

This very distinct little species is a link between the *T.-omphale* and *T.-epigone* groups.

86. TERACOLUS HYBRIDUS, n. sp.

♂ ♀. Above like *T. omphale*, below like *T. omphaloides*, but the secondaries of a more rosy tint, such as occurs in *T. theogone*. Expanse of wings, ♂, 1 inch 9 lines, ♀, 1 inch 10 lines.

♂, Plettenberg Bay ; ♀, Natal. Type, B.M.

This may be the result of a cross between *T. omphale* and *T. omphaloides* ; it, however, clearly approaches *T. theogone* in the coloration of the under surface. Although species of the same genus are frequently known to make matrimonial mistakes, it is doubtful whether in such cases the females are often fertile.

87. TERACOLUS THEOGONE.

Anthocharis theogone, Boisduval, Sp. Gén. Lép. i. p. 575. n. 23 (1836).

Callosune theogone, Kirby, Syn. Cat. p. 502. n. 23*a* (1871).

♂ ♀, S. Africa (5 examples, *E. C. Buxton*) ; Zoolu (*Sir A. Smith*). B.M.

The sexes of *T. theogone* were taken *in copulâ* by Mr. Buxton.

88. TERACOLUS DELPHINE.

Anthocharis delphine, Boisduval, Sp. Gén. Lép. i. p. 577. n. 28 (1836).

Callosune delphine, Kirby, Syn. Cat. p. 503. n. 33 (1871).

Sp. ead. ? ♂ ♀, S. Africa. B.M.

Nobody seems satisfied about the identification of this species ; Mr.

Trimen, so far as I understand him, appears to have identified it with ♂ *T. omphaloides* and ♀ *T. gavisa*.

89. Teracolus procne.

Anthopsyche procne, Wallengren, Lep. Rhop. Caffr. p. 323 (1857).
Anthocharis procne, Trimen, Rhop. Afr. Austr. p. 323. n. 217 (1866).
Callosune procne, Kirby, Syn. Cat. p. 502. n. 17 (1871).

♂ ♀, S. Africa (*E. C. Buxton*). B.M.

We have a small pair of this species presented by Mr. Buxton, the female of which has the orange subapical band rather narrower than usual.

90. Teracolus epigone.

♂. *Anthopsyche epigone* (part), Felder, Reise der Nov. Lep. ii. p. 186. n. 180 (1865).
Callosune epigone, Kirby, Syn. Cat. p. 502. n. 25 (1871).

♂, White Nile (*Petherick*); ? ♀, Orange River, S. Africa. B.M.

I am not certain about the female which I have provisionally referred to this species.

91. Teracolus loandicus.

♂. *Teracolus loandicus* (part), Butler, P. Z. S. 1871, p. 724 (1871); Lep. Exot. pl. xxxiv. fig. 10 (1872).

♀. Very like *T. procne* ♀; but the oblique black band bounding the curved orange band of primaries extremely narrow, the base of the same wings broadly grey; the internal streak ill-defined, no part of it visible on the underside; the undersurface of all the wings considerably paler. Expanse of wings 1 inch 7 lines.

♂, Kinsembo (*Ansell*); ♀, Ambriz (*Monteiro*). B.M.

♂ ♀, var. Altogether less heavily marked; the female scarcely grey at the base, with no trace of the internal streak, and with the orange band broader; angulated streak of secondaries barely indicated, underside paler.

♂ ♀, Quanza, August 1871 (*J. J. Monteiro*). B.M.

It is possible that this may be distinct; but I am unwilling to name it, from the close resemblance which it bears to typical *T. loandicus*.

92. Teracolus eborea.

♂. *Papileo eborea* (part), Cramer, Pap. Exot. iv. pl. 552. figs. C, D (1782).

? Africa.

Cramer figures the male of *T. danae* from Coromandel as the female of this species; and (notwithstanding his remarks upon the coloration of the apical patch) I believe he has improved the scarlet of the apical fascia in his male to make it more nearly agree with its supposed female. The species is clearly nearly related to the following, and never came from any part of Asia.

93. TERACOLUS PSEUDOCALE, n. sp. (Plate VI. fig. 9.)

♂. White above, the base grey; primaries with the apical two-fifths black, enclosing a large, reddish, orange, arched band, divided by the nervures into six parts; a minute black dot at end of cell; secondaries with a marginal series of six large triangular black spots: wings below white, base yellowish; primaries with the apical area creamy yellow, bounded internally by a large, curved, diffused, orange patch, a black dot at end of cell; secondaries with a black-and-orange spot at end of cell. Expanse of wings 1 inch 6–10 lines.

♀. Wings above white, basal two fifths grey, obliquely in primaries, and terminating at second third of internal nervure in a darker grey spot; apical third black, inclosing a curved, orange band, divided by the nervures into five parts; secondaries with well-developed, interrupted, angulated, blackish streak and 5 decreasing, triangular, marginal spots: primaries below nearly as in the male, secondaries pale yellow, with ochreous discal streak and a black dot at end of cell. Expanse of wings 1 inch 5–10 lines.

♂ ♀, S. Africa (*E. C. Buxton*); ♀, Orange River. Type, B.M.

94. TERACOLUS ANGOLENSIS, n. sp.

♂. Closely allied to the preceding, but the apical patch wider upon the costa and continued in the form of a tapering costal border nearly to the base; orange patch half as wide again, its inner black border tapering towards the costa; marginal spots of secondaries more pyramidal and consequently separated: wings below destitute of yellow colouring, the diffused orange patch of primaries broader. Expanse of wings 1 inch 9 lines.

♀. Wings above white or yellow, markings as in the preceding species; but the orange band broader, the greyish areas darker, the border and band of secondaries much more pronounced, and the undersurface more uniform in colour. Expanse of wings 1 inch 7–10 lines.

♂, Angola (*E. C. Buxton*); ♂ ♀, Congo (*Curror*). Type, B.M.

I believe Felder to have described the female of this species as *T. epigone* ♀.

95. TERACOLUS OCALE.

♀. *Anthocharis ocale*, Boisduval, Sp. Gén. Lèp. i. p. 584. n. 37 (1836).

Guinea.

Seems allied to the preceding species.

8*c*. Apical patch of the female black, rarely enclosing small orange spots.

96. TERACOLUS ARETHUSA (T. EVIPPE, var.?).

♀ *Papilio arethusa*, Drury, Ill. Exot. Ent. ii. pl. 19. figs. 5 and 6 (1773).

Anthocharis arethusa ♂, Boisduval, Sp. Gén. Lép. i. p. 582. n. 35 (1836).

Callosune arethusa, Kirby, Syn. Cat. p. 504. n. 45 (1871).
Pieris amytis, Godart, Enc. Méth. ix. p. 123. n. 14 (1819).
Pieris evippe ♀, Godart, *l. c.* p. 122. n. 10 (1819).
♂ ♀, Sierra Leone; ♂, Ashanti; S. Africa (*E. C. Buxton*).

Dr. Boisduval attacks M. Godart for considering this the female of *T. evippe*, Linnæus; it is, however, not improbable that it is only a variety of that species, inasmuch as it chiefly differs from it in the possession of a black dot at the end of the discoidal cell; it certainly is the female of the *A. evippe* of Boisduval; the female described by the latter author is not even nearly related to this species, but is probably identical with, or nearly allied to, *T. gavisa*.

97. TERACOLUS CEBRENE (?=*T. arethusa*, var.).

Anthocharis cebrene, Boisduval, Sp. Gén. Lép. i. p. 583. n. 36 (1836).
Callosune cebrene, Kirby, Syn. Cat. p. 504. n. 47 (1871).
Papilio arethusa, Cramer, Pap. Exot. iii. pl. 210. figs. E, F (1782).
Sierra Leone.

One of our female examples of *T. arethusa* is intermediate between the figures of Drury and Cramer.

98. TERACOLUS EVIPPE.

♂. *Papilio evippe*, Linnæus, Mus. Lud. Ulr. p. 239 (1764); Clerck, Icones, pl. 40. fig. 5 (1764).
Pieris evippe, Godart, Enc. Méth. ix. p. 122. n. 10 (1819).
Anthocharis evippe, Lucas, Lep. Exot. pl. 37. fig. 1 (1835); Boisduval (part), Sp. Gén. Lép. i. p. 573. n. 20 (1836).
♂ ♀, Sierra Leone (*Foxcroft*). B.M.

This is probably the rarer form of *T. arethusa*; the males of the two forms are almost identical.

9. *Wings white, the primaries of the male, and generally of the female, with broad carmine apical area; underside with a well-marked discal series of subocellate spots.*

99. TERACOLUS CINERESCENS.

Teracolus cinerescens, Butler, Cist. Ent. i. p. 172. n. 53 (1873).
Anthocharis danae, Trimen (*nec* Fabr.), Rhop. Afr. Austr. i. p. 44. n. 27 (1862); Hewitson, Gen. Diurn. Lep. pl. 7. fig. 3 (1847).
♂ ♀, Natal, S. Africa (*E. C. Buxton*); Caffraria. B.M.
Var. *Anthocharis danaë*, Wallengren (nec Fabr.), Lep. Rhop. Caffr.
♂ ♀, S. Africa (*E. C. Buxton*). B.M.

This variety has the basal area of the male less strongly suffused with grey, and the under surface of the secondaries of a creamy colour.

100. TERACOLUS EUPOMPE.

♂ ♀. *Pontia eupompe*, Klug, Symb. Phys. pl. 6. figs. 11–14 (1829).

Anthocharis eupompe, Boisduval, Sp. Gén. Lép. i. p. 571. n. 17 (1836).

Callosune eupompe (part), Kirby, Syn. Cat. p. 501. n. 13 (1871).

♀. *Papilio evippe*, Cramer (nec Linnæus), Pap. Exot. i. pl. 91. figs. D and E (1779).

Anthopsyche theopompe, Felder, Reise der Nov. Lep. ii. p. 183. n. 175 ("1865"); Hopffer, Stett. ent. Zeit. p. 432 (1869).

♂, White Nile (*Petherick*). B.M.

I have examined both sexes of this species, taken by Mr. J. K. Lord at Akeek (island).

101. TERACOLUS ANTEUPOMPE.

Anthopsyche anteupompe, Felder, Reise der Nov. Lep. ii. p. 184. n. 175 (1865).

Callosune anteupompe, Kirby, Syn. Cat. p. 501. n. 14 (1871).

Bogos.

102. TERACOLUS ACASTE.

♀. *Pontia acaste*, Klug, Symb. Phys. pl. 7. figs 16, 17 (1829).

Pieris polycaste, Boisduval, Sp. Gén. Lép. i. p. 525. n. 127 (1836).

Ambukol.

I much doubt whether this female would not be better placed next to *T. halimede*, of which Klug says it may be a variety; it is, I should say, more probable that it is the female of *T. pleione* than a variety of *T. halimede*.

103. TERACOLUS PSEUDACASTE, n. sp. (Plate VI. fig. 11.)

♂ *Anthocaris* (sic) *eupompe*, Lucas, Lep. Exot. pl. 36. fig. 4 (1835).

Underside like *T. cinerescens*, but without the blackish line across the cell of primaries or the orange costa to secondaries. Expanse 1 inch 9 lines.

♀. Very like Klug's figure of *T. acaste*, but larger and darker, the apical area of primaries greyish brown, crossed by a curved series of whitish lanceolate streaks, bounded on the inside by black spots. Wings below like the male of *T. cinerescens*. Expanse of wings 2 inches.

♂ ♀, White Nile (*Petherick*). Type, B.M.

This species is a link between the *T. eupompe* and *halimede* groups.

104. TERACOLUS DEDECORA.

Anthocharis dedecora, Felder, Reise der Nov. Lep. ii. p. 184. n. 177 ("1865").

Callosune dedecora, Kirby, Syn. Cat. p. 502. n. 15 (1871).

♂ ♀, Senegal. B.M.

The female forms a link between the *T.-eupompe* and *antevippe* groups. It is the *Anthocharis eupompe*, var., of Trimen (Rhop. Afr. Austr. p. 46), but it is ticketed "Seneg.," not S. Africa. The long description is taken from an Indian species, there being no African butterfly to which it will apply.

105. TERACOLUS WALLENGRENII, n. sp.

Anthopsyche eupompe, Wallengren (nec Klug), Lep. Rhop. Caffr.

This species has three varieties, differing chiefly in size; it is easily distinguished from *T. cinerescens* by the narrower black edging of the apical crimson or carmine patch of the male, the much more yellow apical patch of the female, the restriction of the grey colouring to the base of the wings, the small size of the marginal spots of secondaries, and the deep reddish buff colouring of the under surface of the secondaries and apex of primaries below. Expanse of wings, ♂ 1 inch 4 to 11 lines, ♀ 1 inch 5 to 9 lines.

N.E. of Natal (14 specimens, *E. C. Buxton*). Type, B.M.

This has, I suspect, been confounded with the Indian *T. danaë*; the latter, however, is more like *T. cinerescens*, its female having the aspect of a very dark form of *T. dedecora*.

106. TERACOLUS DANAË.

Papilio danaë, Fabricius, Syst. Ent. p. 476. n. 144 (1775); Donovan, Ins. Ind. pl. 26. fig. 2 (1800).

Pieris danaë, Godart, Enc. Méth. ix. p. 124. n. 20 (1819).

Anthocharis danaë, Boisduval, Sp. Gén. Lép. 1, p. 570. n. 16 (1836).

Calosune danaë, Kirby, Syn. Cat. p. 501. n. 12 (1871).

♂. *Papilio eborea* ♀, Cramer, Pap. Exot. iv. pl. 352. figs. E, F [not C, D], (1782).

♂, Ceylon (*Templeton*, B.M.); Madras, Kurnool, Bombay, Canara, Deccan; ♀, N.W. India (coll. F. Moore).

107. TERACOLUS DULCIS, n. sp. (Plate VII. fig. 13.)

♂. Smaller than *T. danaë*, the crimson apical patch narrower and with narrower internal black border; basal grey suffusion not so dark; black marginal spots of secondaries small, and consequently widely separated; wings below altogether paler than in *T. danaë*, the spots fewer and smaller; no black spots at external angle of primaries. Expanse of wings 1 inch 7 to 9 lines.

♀. Differs from the female of *T. danaë* in its altogether paler colour; with darker apical patch, restricted within the angulated transverse postmedian series of black spots, all the black spots much smaller, the marginal spots of secondaries well separated. Expanse of wings 1 inch 6 to 11 lines.

♂ ♀. Kattywur (coll. F. Moore); ♂, N. India (B.M.)

Var. The female paler at base of wings, with the disk of secondaries immaculate.

♂ ♀, Scinde. Coll. F. Moore.

This species generally stands in Indian collections as the *T. eupompe* of Klug.

108. TERACOLUS DIRUS, n. sp. (Plate VII. fig. 11.)

♀. Allied to the preceding and to *T. pseudacaste*. Wings above white, the base broadly dark grey; an irregular series of black spots through the centre of the disk, large and much interrupted in primaries, small, and terminating in the second median interspace in secondaries: primaries with a well-marked black spot at end of cell; apical area and outer border to external angle brown; the inner margin of apical area scarcely extending beyond the angulated upper portion of the discal series of black spots; a subapical curved series of cream-coloured hastate spots, slightly speckled with scarlet externally, and bounded by the black angulated series: secondaries with a brown border, paler at the internervular folds. Primaries below white, the base broadly sulphur yellow, the apical area pale buff; the four uppermost black spots annular, upon a diffused reddish ground, otherwise as above: secondaries pale buffy whitish; the discal spots of secondaries cordiform, carmine, varied with pearly whitish and black; a spot of the same colours at end of cell. Expanse of wings 2 inches 1 line.

Scinde. Type, coll. F. Moore.

109. TERACOLUS EBOREOIDES, n. sp. (Plate VII. fig. 12.)

♂. Above very like Cramer's figure of male *T. eborea*, but blackish at the base; below very like *T. danaë*, but without the reddish tint round the subapical black spots. Expanse of wings 1 inch 11 lines.

♀. Wings above with the basal third brownish grey: primaries with the centre irregularly white; the apical third dark brown, crossed by four triangular orange spots, bounded internally by black spots; a black spot at the end of the cell; a second constricted spot on interno-median interspace and in the middle of the central white area, and a minute point near the external border; the apical area is deeply bisinuate towards external angle, and decreases in width to the angle: secondaries with a decreasing dark brown border from the apex to the anal angle, slightly intersected with whitish on the internervular folds; the area between the grey part and the outer border white; five black discal spots, and a spot at the end of the cell: wings below as in the male, but slightly deeper in colour. Expanse of wings 1 inch 6 lines.

♂ ♀, India (*W. B. Farr*). Coll. F. Moore.

The above is a very well-marked species.

110. TERACOLUS SANGUINALIS, n. sp.

♂. Much like a small example of *T. danaë*, but the primaries more acuminate, the carmine patch rather brighter; the grey colouring confined to the extreme base and costa, not extending into the secondaries; the marginal spots of secondaries better separated and rather smaller. Apical area of primaries below redder; the angulated series of spots larger and redder; the spots upon the margin near external angle small and indistinct: secondaries white, slightly creamy, with the outer border very feebly ochraceous; the spots, which are arranged as in *T. danaë*, are greyish brown; the spot at end of cell reddish, with a narrow brown margin. Expanse of wings 1 inch 6 lines.

♀. Differs from the female of *T. danaë* in its smaller size, more sulphur-tinted coloration, the regular and much paler basal grey suffusion, which is almost invisible on the secondaries, the much brighter apical carmine patch, the absence of the spot near external angle of primaries, the minute character of the discal spots of secondaries, and the better-defined and narrower outer border; primaries below with the apical area redder, the basal area yellower, and without a terminal grey streak crossing the cell; the black spots smaller: secondaries below distinctly ochraceous, with the discal spots reddish, irrorated with black and grey. Expanse of wings 1 inch 6 lines.

Ceylon (*Stevens*). Type, B.M.

10. *Wings white, the primaries with the apex dark brown, with central orange patch, more or less separated into distinct spots in the female; underside with a more or less defined series of discal spots in secondaries.*

111. TERACOLUS PERNOTATUS, n. sp. (Plate VII. fig. 1.)

♂. White above, with the base pale grey: primaries with a black spot at end of cell; apical area orange, bordered with black-brown, the inner border tapering towards costa; the orange area divided into six parts by the nervures and narrowing to a point behind: secondaries with a black spot on costa and six on outer margin. Below white, the base sulphur-yellow; the cells terminated by black dots; primaries with the apical area greyish, with the orange patch of the upperside dimly visible and bounded externally by four or five almost united red-brown spots in an oblique series: secondaries with a discal arched series of small brown spots; very minute black spots terminating the nervures on outer margin. Expanse of wings 1 inch 6 lines.

♀. White, sometimes tinted with sulphur-yellow; the base pale grey: primaries with a black spot at end of cell; apical area black, with a central nearly straight series of five more or less defined orange spots, only separated by the nervures; three black spots in an oblique series below the median branches, the central one small, the lowest one bifid: secondaries with a curved series of discal spots, black at costa, but gradually fading away towards inner margin; a marginal series of six large spots. Wings below white, the basal area, apical area of primaries, and outer margin of secondaries bright sulphur-yellow; a black spot at the end of the cells, bordered with orange on the secondaries; primaries with an angulated discal series of seven blackish spots: secondaries with a curved discal series of seven sap-green spots; the abdominal and subcostal areas also sometimes irrorated with sap-green. Expanse of wings 1 inch 7 lines.

♂ ♀, Punjab (coll. F. Moore); ♀, Punjab (B.M.).

This species is distinguished by the broad apical patch of the male; the pale grey basal third of the wings, the greyish apical patch below, and the curved discal series of secondaries below.

112. TERACOLUS FARRINUS, n. sp. (Plate VII. fig. 2.)

♂. Distinguished from the preceding by the wider apical area with narrower orange patch, the basal grey scaling darkest on costa, and of a bluish colour; the apical area below lemon-yellow, the spots on its internal border squamose: secondaries above with larger marginal spots; below with the discal spots less strongly defined, and the base not yellow as in the primaries. Expanse of wings 1 inch 8 lines.

♀. Distinguished by the dark brownish grey scaling over basal third, the larger and better-defined black spots, especially those on the disk of secondaries; the under surface of secondaries clouded with greyish. Expanse of wings 1 inch 7 lines.

♂, Kussowlie, N.W. Himalayas; ♂ ♀, India (*Farr*).

Coll. F. Moore.

This species must have been mixed up with Dr. Boisduval's examples of *T. etrida*, since his description of the female agrees with this form alone; it can never, I think, have come from Madras or Pegu.

113. TERACOLUS PURUS, n. sp. (Plate VII. figs. 14, 15.)

♂. Distinguished from *T. pernotatus* by its purer white coloration, the base in the male scarcely visibly tinted with grey, but in the female as in the above-mentioned species; the apical area almost black, with a narrow regular slightly curved band of five orange spots; only the uppermost and lowermost of the three discal spots visible in the female, and the three uppermost of the discal series of secondaries; black marginal spots of secondaries better defined, rounded: wings below with the base and apex of primaries sulphur-yellow; the female with the whole of the secondaries, excepting the discoidal interspace, more or less tinted with the same colour; only the two uppermost of the discal spots in the secondaries of the male below visible; in the female they are all present, but smaller. Expanse of wings, ♂ 1 inch 3 to 6 lines, ♀ 1 inch 6 to 8 lines.

♂ ♀, Punjab (type, B.M.); ♂ ♀, Punjab (coll. F. Moore).

We have what I believe to be this species also, marked "India;" but the examples are in bad condition.

114. TERACOLUS ETRIDA.

♂. *Anthocharis etrida* (part), Boisduval, Sp. Gén. Lép. i. p. 576. n. 24 (1836).

♀. Like the female of *T. purus*, but rather larger, with the apex more rounded, the primaries above yellowish, the costal and discoidal areas of primaries and outer margin of secondaries below distinctly sulphur-yellow. Expanse of wings 1 inch 7 lines.

♂ ♀, Scinde; ♀, Masuri (*Grote*); ♂, Canara (typical form).

Coll. F. Moore.

The male has the orange patch broad at costa and tapering to near the second median branch; but it is more readily recognized by the coloration of the under surface of the secondaries, which is white, with yellow diffused outer border; a small black dot at end of cell, and two subcostal pale brown spots near apex: the Canara example has the basicostal area of primaries above darker than in the specimens from Scinde; but in other respects it agrees with them very fairly: the female from Masuri more nearly resembles the male, the spots below being very pale.

115. TERACOLUS LIMBATUS, n. sp.

♂. Wings above white: the primaries with the extreme base and the costa dark grey; an elongate triangular apical patch from costa to external angle, enclosing a slightly curved tapering orange patch, separated into six parts by the nervures; a minute black dot at end of cell: secondaries with the outer margin bordered by a sinuated brown band. Wings below white, with a black dot at the end of each discoidal cell; the cell of primaries and the apical area sulphur-yellow; a subapical oblique brownish streak tapering towards the costa; apical margin greenish grey. Expanse of wings 1 inch 5 lines.

Ceylon (*Templeton*). Type, B.M.

This is the most distinct-looking of the local forms of *T. etrida*; it probably ranges to Madras; for Boisduval says (in his description of *T. etrida*), "Ailes inférieures avec le bord entrecoupé de points noirs, assez gros, isolés ou *réunis en une bande crénelée*."

116. TERACOLUS CASIMIRUS, n. sp. (Plate VII. fig. 5.)

♂. Wings above white, the base grey, more extended in primaries than in secondaries; primaries rounded at apex; the apical area from costa to first median branch black-brown, enclosing a slightly curved orange band, at the end of which is a minute dot of the same colour, the band is divided by the nervures into five parts; a black dot at the end of the cell: secondaries with four large marginal dark brown spots, and a minute dot of the same colour; a subapical costal ill-defined brown litura. Primaries below white, the basal two thirds of the cell sulphur-yellow; apical area pale ochre-yellow, bounded internally by an oblique greyish streak; a black dot at the end of the cell: secondaries sandy whitish, irrorated with brown; an arched macular brownish streak from costa to interno-median area (interrupted, as usual, on the discoidal interspace); a black and yellow dot at the end of the cell; outer border yellowish, irrorated with brown atoms. Expanse of wings 1 inch 7 lines.

Bimbur, Cashmere (*Capt. Reed*). Coll. F. Moore.

117. TERACOLUS BIMBURA, Moore. (Plate VII. figs. 3, 4.)

♂. Wings above white, greyish at base: primaries with a triangular orange patch at apex, narrowly bordered with black-brown, the outer border sinuated; a minute black dot at end of cell: secondaries with four marginal black dots. Primaries below white, the basal three fifths of discoidal cell sulphur-yellow; apical area greyish stramineous externally, sulphur-yellow internally, bounded within by a well-defined oblique greenish grey bar; a black dot at the end of the cell: secondaries sandy whitish, basal three fifths densely irrorated with brown, interrupted through the cell and discoidal interspace by a whitish streak, and bounded externally by squamose brown spots; outer border somewhat yellowish; a black and yellow dot at the end of the cell. Expanse of wings 1 inch to 1 inch 7 lines.

♀. Apex of primaries above black-brown, crossed by a curved band of five orange divisions, the last of which touches the ground-colour; a black dot on second median interspace; otherwise as in the male. Primaries below with the apical area pale ochraceous, bounded internally by an oblique series of four brown spots, a similar spot at centre of second median interspace, and a second on interno-median interspace touching the first median branch: secondaries sandy throughout, irrorated with brown; discal spots brown; otherwise as in the male. Expanse of wings 1 inch 4 lines.

♂ ♀, Bimbur, Cashmere (*Capt. Reed*); ♂, Bombay (coll. F. Moore); ♂ ♀, N. India (B.M.).

This is a very distinct species, easily recognized by the coloration of the under surface: the examples from Bombay vary much in expanse, the typical male from Bimbur being intermediate and of the same size as the female.

11. *Wings white or sulphur-yellow, the primaries with the apical area broadly golden-orange, bordered externally in the male with black; in the female it is interrupted by an irregular black transverse bar, sometimes separated into distinct spots; in two or three species the males have a few scattered black scales along the inner border of the orange.*

118. TERACOLUS EVAGORE.

Pontia evagore, Klug, Symb. Phys. pl. 8. figs. 5, 6 (1829).

Anthocharis evagore, Boisduval, Sp. Gén. Lép. i. p. 579. n. 30 (1836).

Callosune evagore, Kirby, Syn. Cat. p. 503. n. 36 (1871).

Anthocharis heuglini, Felder, Wien. ent. Monatschr. iii. p. 272. n. 20 (1859).

Anthopsyche heuglini, Felder, Reise der Nov. Lep. ii. pl. 25. fig. 4 ("1865").

♂, White Nile (*Petherick*). B.M.

119. TERACOLUS DEMAGORE.

Anthopsyche demagore, Felder, Reise der Nov. Lep. ii. p. 186. n. 179 ("1865").

Callosune demagore, Kirby, Syn. Cat. p. 503. n. 37 (1871).

♀, White Nile (*Petherick*). B.M.

120. TERACOLUS CITREUS, n. sp.

♂. Primaries above whitish at base, becoming more and more distinctly sulphur-yellow to beyond the middle; apical area bright golden-orange, with a linear black marginal border: secondaries white, with the outer margin narrowly sulphur-yellow, diffused. Primaries below pale sulphur-yellow, the apical area lemon-yellow, deepest at the margins; three decreasing brown spots placed obliquely between the subcostal branches: secondaries fleshy pink, changing to pale yellow externally, reticulated with brown; several brownish spots beyond the middle; a black dot at end of cell. Expanse of wings 1 inch 4 to 6 lines.

♀. Above like *T. evarne* female, but the black markings more restricted. Primaries below pale yellow, whitish towards external angle; apical area ochraceous, reticulated with grey; blackish spots as above: secondaries pale flesh-colour, yellowish on outer margin, reticulated with dark brown, an arched series of discal yellowish spots crossed by blackish lituræ; a black-edged white spot at the end of the cell. Expanse of wings 1 inch 6 lines.

♂ ♀, Hor Tamanib (*J. K. Lord*) = *T. evarne* of Walker (nec *Klug*); ♀, White Nile (*Petherick*). B.M.

121. TERACOLUS KEISKAMMA.

Anthocharis keiskamma, Trimen, Rhop. Afr. Austr. p. 56. n. 37, pl. 2. figs. 3, 4 (1862–66).

♂ ♀, Keiskamma river (*Trimen*); ♂, S. Africa. B.M.

122. TERACOLUS TOPHA.

Anthopsyche topha, Wallengren, Lep. Rhop. Caffr. p. 15 (1857).

♂ ♀, S. Africa. B.M.

This species is intermediate between *T. keiskamma* and *T. auxo*.

123. TERACOLUS XANTHEVARNE, n. sp.

Anthocharis evarne, Lucas (nec Klug), Lep. Exot. pl. 37. fig. 3 (1835).

♂. Wings above sulphur-yellow, the primaries brightest in colour, with the apical area broadly golden-orange, with rather a narrow sinuated black border from the middle of costa to the first median branch; costa grey: secondaries with small black spots at the ends of the nervures. Wings below lemon-yellow; the primaries sulphur-yellow towards the base; two subapical brownish dots between the subcostal branches: secondaries with a black dot at end of cell. Expanse of wings 1 inch 8 lines.

White Nile (*Petherick*). Type, B.M.

I have also examined a male taken by Mr. Lord at Harkeko.

124. TERACOLUS SYRTINUS, n. sp.

♂. Wings above much as in the preceding species, but the costa blackish brown from base to apex, and the inner edge of the orange patch sprinkled with blackish scales; wings below sulphur-yellow, the apical area lemon-yellow, a minute blackish dot at end of cell in secondaries. Expanse of wings 1 inch 9 lines.

Senegal. Type, B.M.

Intermediate in character between the preceding and *T. auxo*.

125. TERACOLUS AUXO.

Anthocharis auxo, Lucas, Rev. Zool. p. 422 (1852).

Callosune auxo, Kirby, Syn. Cat. p. 501. n. 11 (1871).

♂ ♀, Natal. B.M.

This is probably the *A. evarne* of Trimen.

126. TERACOLUS EVARNE.

Pontia evarne, Klug, Symb. Phys. pl. 6. figs. 1–4 (1829).
Anthocharis evarne, Boisduval, Sp. Gén. Lép. i. p. 569. n. 15 (1836).
Callosune evarne (part), Kirby, Syn. Cat. p. 501. n. 10 (1871).

Ambukol.

I have never had an opportunity of seeing a genuine *T. evarne*; it is evidently a white-winged species. Entomologists almost invariably represent it in their collections by examples of one or other of the species allied to *T. keiskamma*.

127. TERACOLUS EUCHARIS.

♂. *Papilio eucharis*, Fabricius, Syst. Ent. p. 472. n. 127 (1775).
♂ ♀. *Euchloë eucharis*, Butler, Fabr. Cat. p. 215. n. 5 (1869).
Callosune eucharis, Kirby, Syn. Cat. p. 500. n. 9 (1871).
Papilio aurora, Cramer, Pap. Exot. iv. pl. 299. figs. A–D (1782).
Pieris titea, Godart, Enc. Méth. ix. p. 124. n. 21 (1819).
Pontia titea, Horsfield, Cat. Lep. E.I. C. p. 141. n. 69 (1829).

♂ ♀, Ceylon (*Templeton*). B.M.

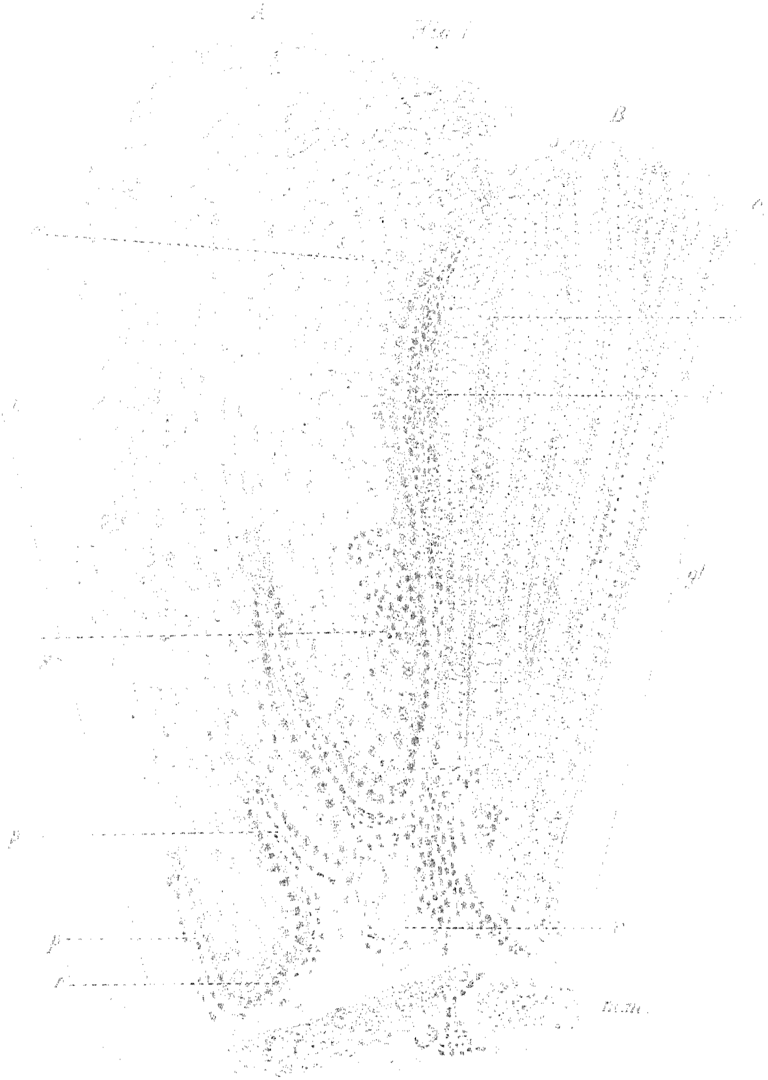
Mr. Moore has a female from the Deccan.

128. TERACOLUS PSEUDEVANTHE, n. sp. (Plate VII. fig. 16.)

♂. Above like *T. eucharis*, but larger; the outer black border beginning at apical three fifths of costa, continued round the outer margin as a rather wide sinuated band to near external angle, and throwing up an irregular projection across the end of first and the middle of the second median interspace; edge of costa and base sprinkled with brown scales: secondaries with four marginal brown dots. Primaries below sordid white, the base sulphur-yellow; apical area lemon-yellow; the outer margin orange, with black dots at the end of the nervures; a transverse sigmoidal postmedian subapical ferruginous streak: secondaries sandy white; a transverse subapical ferruginous dash; an interno-discal transverse macular streak of ochreous speckled with brown; a black-and-yellow dot at end of cell. Expanse of wings 1 inch 11 lines.

♀. Above white, base grey; apical area irregularly black-brown, crossed by four cuneiform orange or white spots; a black dot at end of cell, and a black interno-median spot towards external angle: secondaries with an oblique Z-shaped costal black marking near apex; five large black-brown marginal spots. Primaries below white, with the base sulphur-yellow; apical area sulphur-yellow, becoming ochreous externally, and crossed by a macular brown streak, ending in a black spot; a black spot on interno-median interspace, and a black dot at end of cell; black marginal dots as in the male: secondaries sordid white, reticulated with sap-green; two streaks of the same colour answering to those on the secondaries of the male; outer margin yellow, spotted with sap-green. Expanse of wings 1 inch 9 lines.

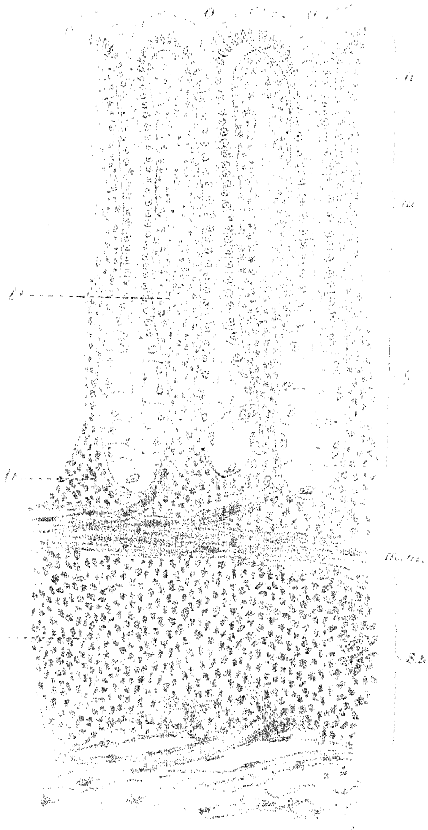
♂, India (B.M.); ♂ ♀, Bombay (7 examples), coll. F. Moore.



[illegible] J. Smit lith.

STOMACH OF MACROPUS GIGANTEUS.

Fig. 3.



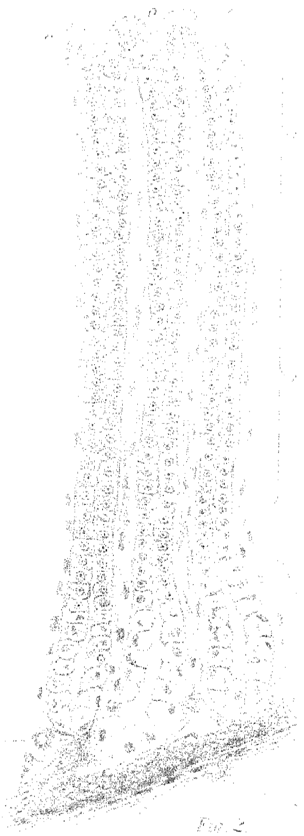


Fig. 2.

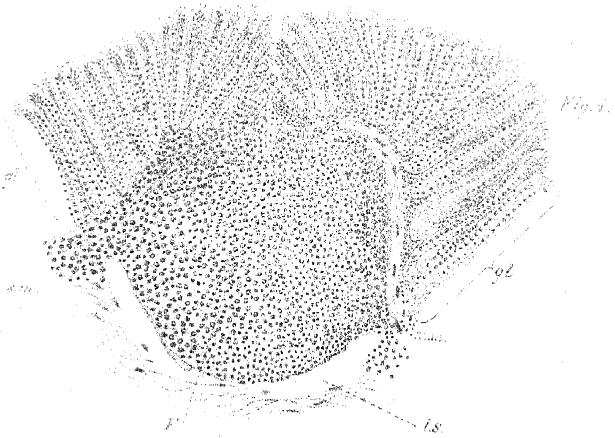
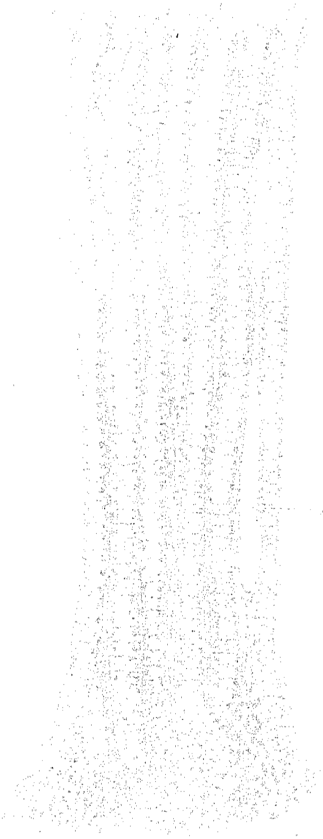


Fig. 1.

[illegible] del.

J. Smit lith.

Figs 2 & 3 STOMACH OF MACROPUS GIGANTEUS.



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J. Smit lith.

Fig. 5. STOMACH OF MACROPUS GIGANTEUS.
Fig. 6. STOMACH OF DORCOPSIS LUCTUOSA.

M & N. Hanhart imp.

Fig. 7.

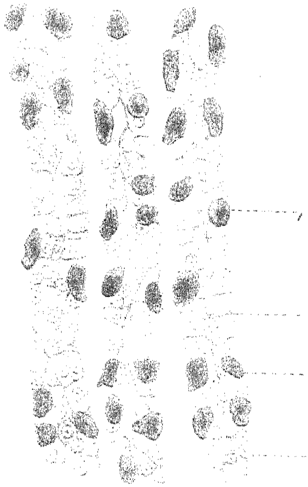


Fig. 9.

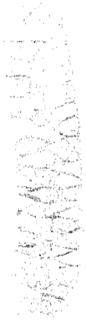


Fig. 8.

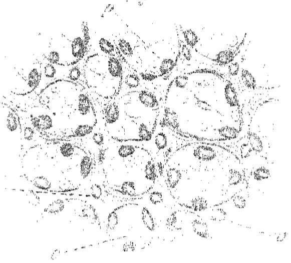
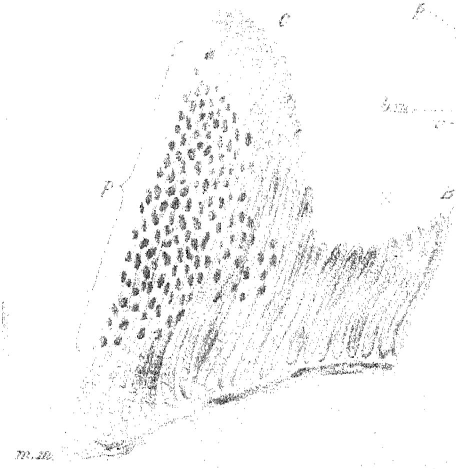


Fig. 10.



E. A. Schafer et D. J. Williams. del.

J. Smit lith.

STOMACH OF DORCOPSIS LUCTUOSA.

The greater size, apical coloration, and markings of the under-surface readily distinguish this species from *T. eucharis*.

12. *Wings of the male with the orange patch narrow, not yellowish, only touching the ground-colour opposite to the end of discoidal cell; apex of primaries below grey-speckled; secondaries creamy whitish, reticulated with brownish green.*

129. TERACOLUS EVANTHE.

Anthocharis evanthe, Boisduval, Sp. Gén. Lép. i. p. 567. n. 13 (1836).

Callosune evanthe, Kirby, Syn. Cat. p. 500. n. 8 (1871).

S. Africa. B.M.

Pieris doxo of Godart is probably a *Synchloë* allied to *S. suasa*; *Pontia eulimene*, Klug, is an *Ixias*; and *Anthocharis phænon*, Trimen, is described as allied to the latter, therefore probably belongs to the same genus.

EXPLANATION OF THE PLATES.

PLATE VI.

Fig. 1. *Teracolus flaminia*, p. 140.
2. —— *lyæus*, p. 141.
3. —— *subfumosus*, p. 139.
4. —— *lucullus*, p. 143.
5. —— *friga*, p. 142.
6. —— *lycoris*, p. 140.

Fig. 7. *Teracolus ithonus*, p. 146.
8. —— *halyattes*, p. 145.
9. —— *pseudocale*, p. 154.
10. —— *suffusus*, p. 152.
11. —— *pseudacaste*, p. 156.
12. —— *hero*, p. 150.

PLATE VII.

Fig. 1. *Teracolus pernotatus*, p. 159.
2. —— *farrinus*, p. 159.
3, 4. —— *bimbura*, p. 161.
5. —— *casimirus*, p. 161.
6. —— *rosaceus*, p. 134.
7. —— *oriens*, p. 134.
8, 9. —— *carnifer*, p. 138.

Fig. 10. *Teracolus vestalis*, p. 135.
11. —— *dirus*, p. 157.
12. —— *eboreoides*, p. 158.
13. —— *dulcis*, p. 157.
14, 15. —— *purus*, p. 160.
16. —— *pseudevanthe*, p. 164.

9. On the Structure of the Mucous Membrane of the Stomach in the Kangaroos. By EDWARD A. SCHÄFER, Assistant-Professor of Physiology, and D. JAMES WILLIAMS, Student of Medicine, in University College, London. (Communicated by A. H. GARROD, M.A., F.Z.S., Prosector to the Society.)

[Received December 17, 1875.]

(Plates VIII.–XI.)

The observations here recorded have been made upon the stomachs of two Kangaroos belonging to distinct genera. One was that of the great Kangaroo, *Macropus giganteus*; the other of *Dorcopsis luctuosa*, a specimen of which died some months back in the gardens of the Society. This latter has been described (P. Z. S. 1875, p. 48) by Prof. A. H. Garrod, the Prosector to the Society, to whom we are indebted for the opportunity of examining the organ in question in these animals. Our original object was simply to record in general terms the differences in microscopic structure presented by those parts of the membrane which have a different appearance to the naked eye; but since, in spite of recent researches, our knowledge of the minute structure of the gastric mucous membrane is still confessedly imperfect, it became obvious that it would be necessary to enter upon a minute examination of the several parts; especially as they present very well-marked differences, and, in some cases, peculiarities of structure which tend to elucidate points yet in dispute with regard to the gastric mucous membrane of the higher Mammalia and of Man.

As is well known, the stomach is, in the Kangaroo, a long sacculated organ not unlike the human colon; and the sacculations, as in that, are due to the presence of three longitudinal bands of plain muscular fibre, situate on the exterior underneath the serous membrane and shorter than the rest of the gastric wall, so that this is bulged out at intervals into sacculi separated by constrictions or inward folds of the membranous wall. One of the three bands is placed below along the greater curvature; and it is on either side of this that the sacculi are most marked; there are none at the lesser curvature, nor is the pyloric extremity sacculated at any part of its circumference. Besides the inwardly projecting folds between the sacculi, and which involve all the coats of the stomach, the mucous membrane shows the rugæ ordinarily met with in a stomach not completely distended, and produced by contraction of the muscular coat. There are also in certain parts more minute folds, which would, no doubt, be effaced by complete distention of the organ, and which are probably due to a similar contraction of the muscular layer of the mucous membrane (*muscularis mucosæ*).

In the diagrams of the two stomachs which are here given, and in the accompanying general description, they are for convenience' sake treated as if they were more or less straight organs extending across the body from left to right as in the human subject, whereas in reality they are twisted upon themselves. A detailed description of the form of the marsupial stomach and its relations to other parts is, of course, foreign to the subject of the present paper, and must be sought for in recognized treatises on comparative anatomy *.

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* The following are the dimensions of the organs as they appear after preservation in spirit:—

	Dorcopsis luctuosa.		*Macropus giganteus.*	
	ft.	in.	ft.	in.
Length along lesser curvature	1	0	1	8
Length along greater curvature, the sacculations not being taken into account	1	7	2	5
Length along greater curvature, reckoning in the sacculations	2	10	5	0
Greatest circular measurement	0	7	0	7

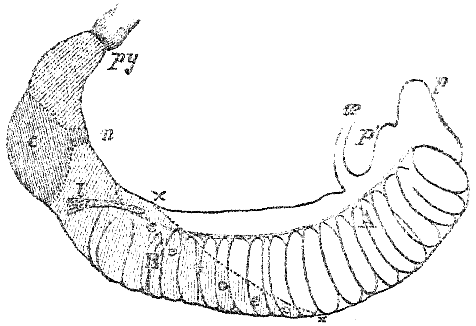
In both cases the stomachs were filled with partially digested food.

Obvious characters of the Mucous Membrane.

With the unassisted eye three distinct regions can be detected in the stomachs of both animals, the mucous membrane presenting well-marked differences in feel, appearance, and, as will be presently seen, in microscopic structure. For the most part they are marked off from each other by distinct lines of demarcation; these, however, are more obvious between the first and second regions than between the second and third, although, in the latter case also, especially in *Dorcopsis,* the distinction can be made out even with the naked eye.

In the two species examined these three regions have somewhat different distributions, as is indicated in the accompanying diagrams. Thus, in *Dorcopsis* (Diagram 1) the first or cardiac region (A), which is covered with an epithelium obviously continuous with and similar to that of the gullet, occupies more than a third of the inner surface of the organ, lining the whole of the cardiac fundus, and terminating towards the middle of the stomach by a well-marked line of demarcation (×), which extends from the lesser curvature obliquely downwards and to the left along the anterior and posterior walls to end in the greater curvature about opposite to the opening of the gullet, or a little to the right of that point. Commencing on either side of the cardia two parallel ridges or folds of the mucous membrane (not represented in the diagram) pass for about 3 inches along the lesser curvature, depending into the cavity of the organ. They are little more than half an inch apart, and not quite half an inch in depth; they become less prominent and gradually subside towards their termination. They bring to mind the ridges which are found in a somewhat similar situation in the Ruminant stomach, but they are by no means so strongly muscular. The second region (B) commences at the oblique line above traced out, which separates it from the first or cardiac region, and extends from here to the left, as far as the pylorus, comprehending all the rest of the inner surface of the organ except a circular patch (C) about 2½ inches in diameter, which occupies the

Diagram 1.

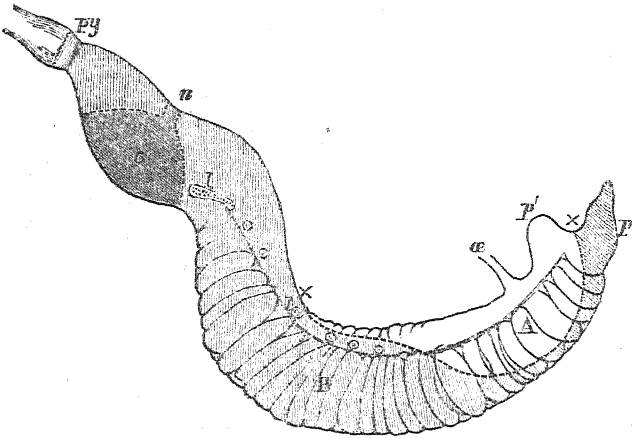


Stomach of *Dorcopsis luctuosa.*

pyloric fundus. This patch is distinguishable to the unaided eye chiefly by its greater thickness, smoother surface, and by a slight furrowed line which partly encloses it. It shows under the microscope glands differing in character from those of the surrounding region, and is therefore here described as a *third* region of the mucous membrane. But this third region is not entirely confined to the circular patch; for a narrow tract of mucous membrane (*n*) containing similar glands extends from the upper limit of the patch on either side to meet its fellow above at the lesser curvature, thus completing an irregular zone around this part of the stomach.

In *Macropus giganteus* the epithelium of the first region (Diagram 2, A) has a much more limited distribution than in *Dorcopsis*. The tract which it covers is widest in the neighbourhood of the gullet, whence it passes over the front and back of the stomach. Even here it does not extend as far down as the greater curvature; so that the two parts do not meet below. Moreover the left end of the stomach, which terminates in a pouch-like projection (*p*), is not lined by this epithelium, although a second smaller pouch (*p′*), directed upwards and situated nearer the gullet than the first one, receives a lining from it. Both these pouch-like projections are

Diagram 2.



Stomach of *Macropus giganteus*.

present also in *Dorcopsis luctuosa*; but they are both lined with hard epithelium like that of the rest of the cardiac fundus in this animal. Anteriorly the hard epithelium gradually narrows in *Macropus giganteus* until it becomes reduced to a mere strip along the lesser curvature, and eventually ceases altogether about halfway between the two extremities of the stomach. The ridges of mucous membrane which extend towards the right from either side of the cardiac orifice are only slightly marked in the stomach of *Macropus*. The second region (B) has a greater extent in *Macropus giganteus* than in *Dorcopsis*. It occupies all the rest of the inner surface of the stomach except (as in *Dorcopsis*) a circular patch (C) about 3 inches in diameter, situate at the pyloric fundus, and not marked off from the rest by any well-defined naked-eye appearances except the great thickness of the mucous membrane. But microscopical examination shows that the glands of this patch present material differences from those of the rest of the stomach, whilst resembling those of the corresponding part of the *Dorcopsis* stomach; so that this patch is to be taken as representing the third region in *Macropus* also. The tract *n*, moreover, which passes in *Dorcopsis* over the upper part of the stomach in this place, is also represented in *Macropus*. The second region may be said to commence at the extreme end of the cardiac fundus, where its mucous membrane lines the pouch (*p*) above referred to as not being covered by the hard gullet-epithelium; from here it passes to the right, along the greater curvature of the stomach, gradually narrowing at first, so that opposite the œsophagus it forms a strip only about $\frac{3}{4}$ of an inch wide, bounded on either side by the epithelium of the first region, but subsequently becoming gradually wider until it extends continuously round the organ.

In both animals the mucous membrane of the second region has here and there insular elevations flattened on the surface and beset all over with small rounded eminences, each with a little pit at its summit as if made with the point of a pin. These elevated patches vary in size, but seem to have a fairly regular distribution (Diagrams 1 and 2, *l*, *l*). Thus in both animals there is a large triangular patch on each wall of the stomach, the base of which is close to the third region of the mucous membrane, while the apex of the triangle extends upwards and to the left towards the lesser curvature. From near the apex a chain of smaller and more circular patches is continued for some distance parallel to the line of demarcation between the first and second regions—in *Dorcopsis*, in fact, as far as the second region extends. As the result of microscopical examination clearly shows, these elevations are owing to accumulations of lymphoid tissue in and beneath the mucous membrane; and they may therefore be termed "lymphoid patches." They are in many respects analogous to Peyer's patches of the small intestine.

Microscopical Characters of the Mucous Membrane.

The results of the microscopical examination of the several regions correspond for the most part in both animals (as might indeed have been expected in genera so closely allied); so that the same description will apply to both. We shall afterwards take the opportunity of pointing out any special peculiarity which may obtain in either. The figures, which have been taken indiscriminately, some from the one animal and some from the other, will, for the most part, serve to illustrate the structure of the corresponding parts in both.

The Mucous Membrane of the First Region.—This is covered with a coating of dense stratified epithelium (Plate VIII. fig. 1, S) continuous with that of the gullet, and resembling it in all respects. It is harsh to the feel, and in this respect contrasts strongly with the soft mucous membrane of the second and third regions. It is unnecessary to enter into details of structure as regards this epithelium, since it resembles others of its class, the lowermost cells (c') being rounded or somewhat columnar, the layers above these composed of polyhedral elements with dentated or ridged surfaces, and those above these again swollen and enlarged; finally, most superficial of all are several strata of flattened scaly cells forming a horny layer (h) distinguished, both by its somewhat fibrous appearance in section and by its different reactions to staining fluids, from the Malpighian layer or layers upon which it rests. Here and there one or two lymphoid corpuscles are to be seen in between the deeper epithelium-cells. A few papillæ of the mucous membrane project into the deeper parts of the epithelium; but neither an inspection of sections that were made from different parts, nor a careful examination of the surface, could detect any racemose or tubular glands of any sort in the region covered by this epithelium. At the line of demarcation separating it from the glandular portion of the stomach, the surface of the mucous membrane undergoes an abrupt change, perceptible as easily by the unassisted eye and hand as with the aid of the microscope. The manner in which the change takes place is represented in the figure, but will be more readily understood after the structure of the succeeding portion of the stomach has been described. It is sufficient here to mention that all the layers of cells of which the stratified epithelium is composed cease abruptly, with the exception of the deepest layer; this, on the contrary, becomes directly continued into the simple layer of columnar epithelium which covers the whole of the glandular portion, and which sends prolongations into the mouths of the glands.

The Mucous Membrane of the Second Region.—This region and the remaining one include the whole of the glandular portion of the organ. The mucous membrane is soft to the feel and of considerable thickness; and its surface is closely dotted with the orifices of the tubular glands (Plate IX. fig. 2), which are densely arranged and pass either vertically or somewhat obliquely through the whole thickness of the membrane (which may, indeed, be stated to be in a large measure composed of them) as far as the muscularis mucosæ ($m.\ m$), which, as in man, limits the mucous membrane and separates it from the submucous areolar tissue. Each gland-tube is bounded (or rather may be said to be formed) by a delicate basement membrane, appearing in section as a mere line outside the epithelium of the gland. The tubes are cylindrical for the greater part of their length, but are somewhat enlarged towards the orifice, and also usually swollen out at the bottom (b). The surface of the mucous membrane between the orifices of the tubular glands is, as usual, covered by a single layer of characteristic columnar epithelium-cells (c), with the attached ends tapering, apparently designed, like the bricks in an arch, to accommodate themselves to the rounded surface to which they are attached; and this epithelium is continued also into the openings themselves. Tracing it further into the gland, we find the cells, still columnar, less tapering at their fixed extremities; and, moreover, while in the mouths of the glands, as on the general surface, they stand vertical to the basement membrane with their free ends on the same level, in the throat of the glands, on the other hand, they slant upwards, so that they more or less overlap one another (fig. 2, *n*). Further downwards in the tube the cells become gradually shorter, so as to appear quadrangular or cubical in form; at the same time the lumen of the tube becomes much narrowed, and, indeed, in vertical sections of the mucous membrane is in some parts hardly perceptible. These shortly columnar or cubical epithelium-cells occupy the greater part of the length of the tube (*m*). They have each a very distinct round or oval nucleus with one or two nucleoli; and the protoplasm of the cell, which is granular in appearance, becomes stained by logwood, although not nearly so intensely as the nucleus.

Towards the fundus (*b*) of the gland the cells undergo a change. They become gradually larger, and rounded or polyhedral in shape; their outlines become more distinct; and the substance of the cell acquires a clear or very faintly granular aspect, and, moreover, becomes hardly at all stained by logwood. Further, the nuclei, for the most part, have not their usual characteristic vesicular appearance, but in most of the cells (which line, and in some cases almost fill, the fundus) appear as intensely stained, shrunken or compressed bodies, usually situated excentrically in the cell, and not frequently flattened up against the basement membrane. In short, the appearance of these polyhedral cells of the fundus of the gland brings strongly to mind the cells which occupy the alveoli of the salivary gland (submaxillary); and it is not impossible that the clear, swollen-out aspect they present may be due to a cause similar to that to which the salivary cells are believed to owe their characteristic appearance, the presence, namely, within the cells at the time of death of mucus or some similar substance, which swells up on the addition of fluid. Or it may be that the protoplasm of these lowermost cells is younger and less changed than that of the other cells of the gland, and consequently that they are more readily acted upon by reagents, or by the secretion of the gland itself after death, than the rest. At any rate there seems a close analogy between the structure of the deeper parts of these tubular glands and the alveoli of the compound racemose glands. At the same time it must be remembered that some of the latter class of glands, the pancreas for example, do not exhibit the clear, swollen-out cells with excentrically placed nuclei, but their alveolar walls resemble more, on the contrary, the cubical cells of the middle parts of the tubular glands above described; and it is worthy of note that in some parts of the second region of the Kangaroo stomach, those for instance in the neighbourhood of the pylorus, the tubular glands, which are here very long, are lined in the deeper as well as in the middle parts, by cubical or shortly columnar cells which are similar throughout.

The substance of the mucous membrane between the tubular glands of the second region is in most parts composed of delicate connective tissue with numerous corpuscles, supporting the blood-vessels. Here and there well-defined cleft-like spaces are seen in the sections. These, no doubt, represent the lymphatics which are now known to be so numerous in the gastric mucous membrane *. They are particularly large and well marked in the neighbourhood of the pylorus (fig. 5).

In some places the interglandular tissue contains a considerable number of lymphoid cells; but this is more particularly the case in the neighbourhood of the lymphoid patches, to the description of which we shall immediately come. Moreover a certain amount of lymphoid tissue may intervene between the bases of the glands and the muscularis mucosæ. This last-named layer consists in most parts of two strata of muscular fibre-cells which cross one another, the inner being circular, the outer longitudinal in direction. From the more superficial or inner stratum bundles of fibre-cells pass up here and there between the glands, towards the surface; but it has not been easy to trace their ultimate destination. Probably they become eventually attached to the basement membrane.

Structure of Lymphoid Patches.—These localized elevations or thickenings differ from the rest of the mucous membrane of the second region in the fact that both mucosa and submucosa are largely formed by lymphoid tissue, *i.e.* lymph corpuscles supported by a fine retiform tissue. This (fig. 3) extends in the mucosa towards the surface of the membrane between the glands, and is also found as a distinct stratum at their base. In the submucosa it forms a layer of some thickness immediately underneath the muscularis mucosæ. The lymphoid tissue does not form a uniform layer, but is gathered at intervals into well-marked nodules or follicles (fig. 4), which cause the small rounded elevations already noticed on the surface of the lymphoid patch. Each of these elevations is, it will be remembered, marked with a small central pit (*d*). At the bottom of this the tubular glands fail, and the summit of the follicle is separated from the free surface merely by the layer of columnar epithelium, which itself contains numerous lymph corpuscles between the columnar cells; and these are also to be noticed free within the depression, as if they had emigrated from the subjacent lymphoid nodule. Indeed it may be doubted whether in some instances the covering of epithelium over the summit of the nodule may not be altogether absent; some of the sections obtained appear to show this; but it is possible that it may have become accidentally detached. Below the lymphoid layer of the submucosa is the ordinary connective tissue of that tunic (*s. m*) supporting the larger blood-vessels, nerves, and lymphatics; and at the base of each follicular accumulation there is commonly (as shown in fig. 3) a large lymphatic sinus, into which the follicle partly dips. At other places the lymphoid tissue of the mucosa is separated from that of the submucosa by the layer of muscularis mucosæ (fig. 3, *m. m*); but the latter is wanting opposite the summit of each follicle (fig. 4), and the lymphoid tissue of the one blends with that of the other. In this particular, as in most others, the lymphoid patches of the Marsupial stomach exactly resemble the patches of Peyer of the human ileum, only that in the latter the lymphoid follicles occupy more of the mucous membrane and come entirely to the surface, whereas, in the gastric patches in question, the follicles, as well as the remainder of the lymphoid tissue, are surmounted by tubular glands, except at the centre of each, where the surface is pitted in as far as the summit or cupola of the follicle. The glands over these lymphoid patches are somewhat shorter than those which are found in the rest of the mucous membrane of the second region, but entirely agree with them in structure (figs. 3 & 4).

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* Lovén, Nord. Med. Arkiv, 1873.

Transition of the Stratified Epithelium of the First Region into the simple Columnar Epithelium of the Second Region.—The manner in which this occurs will be readily understood by again referring to fig. 1. Close to the limit between these two regions the stratified epithelium (*S*) of the first is of considerable thickness, nearly as thick, indeed, as the whole mucous membrane of the second. If the lower line of the epithelium be followed, it will be seen that just as it approaches the junction it rises rather abruptly towards the surface, the layers of cells above it being continually less and less numerous until they are reduced to six or eight only. The lowermost columnar cells (*c'*) of the stratified epithelium then become directly continued into the simple columnar epithelium (*c*) of the glandular region, whilst the layers above it cease abruptly, one or two cells often projecting at the edge like bricks from the end of a wall. The tubular glands begin immediately beyond this, the first ones passing down parallel with the ascending line of the stratified epithelium; but they are separated from it by somewhat more of the tissue of the mucosa than they are from one another. This tissue (*i*, *i'*) contains very numerous lymphoid cells, and many are seen also in between the lower cells of the stratified epithelium of the immediate neighbourhood (at *ly*). Transitional forms of epithelium between the scaly stratified and the columnar (as described by Henle at the line of transition of gullet into stomach-epithelium in man) do not occur, but the passage of the one into the other is quite abrupt and effected by the cessation of all the layers of the stratified epithelium except the lowermost.

Structure of the Second Region, in the neighbourhood of the Pylorus.—The lining membrane as well as the muscular coat is here very thick, especially in *Macropus giganteus*; and the gland-tubes are correspondingly long (fig. 5). They are not enlarged at the fundus; and the cells of this are similar in appearance to those of the rest of the tube. Numerous bundles of muscular tissue (*m'*. *m'*) pass from the muscularis mucosæ upwards towards the glands. But the most striking feature of the part is the number and size of the lymphatics (*l*, *l*). These appear in sections as large well-defined clefts in the connective tissue between the glands. The clefts are not merely accidental; for they have a definite wall of flattened nucleated cells, like the commencing lymphatics elsewhere.

Two such clefts of considerable size are seen between the glands in fig. 5; other smaller clefts, also for the most part representing sections of lymphatics, are seen in the interglandular tissue in various parts of the mucous membrane. It will be observed, moreover, that the lymphoid tissue at the base of the glands is more abundant here than in the rest of the second region (fig. 2), with the exception of the lymphoid patches, and that the prolongations of the muscularis mucosæ towards the surface between the glands are more numerous ($m'.m'$).

The Mucous Membrane of the Third Region.—This is very thick both in *Dorcopsis luctuosa* and in *Macropus giganteus*, the thickness being as usual due to the length of the gland-tubes. These resemble in many respects the pyloric part of the second region just described; thus they are long straight tubes lined near the orifice with columnar epithelium, and in all the rest of their extent with small cubical or polyhedral cells, which in many parts nearly fill up the tubes. But there is this important difference, that superadded to these and situated outside of them (but still within the basement membrane, which they often cause to bulge outwards) there are, in the middle parts of the length of the gland (figs. 6 & 7), certain other cells of a spheroidal or ovoidal shape and granular appearance. These are what have long been known as peptic cells; since it is believed, although it has not yet been conclusively proved, that they are the source of the pepsin of the gastric juice. They were termed by Rollett* the delomorphous cells of the gland, whilst the other, more centrally situated, and usually less obvious cells, which are continuous above with the columnar epithelium of the surface, he has termed adelomorphous. For the present it will be better to adhere to the old terminology (*peptic cells*) for the rounded cells, and to term the angular ones, which line the whole tube within them, *central cells*. The glands, moreover, in which the peptic cells occur we may continue to term the peptic glands, and the region of the stomach occupied by them the peptic region, without at the same committing ourselves so far as to maintain that the other portions of the stomach do not also, as some physiologists think, yield pepsin.

To return to the structure of the glands. The spheroidal peptic cells vary in number in different glands, being fewest in the parts of the peptic region which are nearest the boundary between this and the second or general glandular region. It frequently happens that these peptic cells do not reach the fundus (*b*) of the gland, which is not larger in these glands than the rest of the tube, and is occupied exclusively by central cells which resemble the cubical cells of the other glands, but are smaller and more closely packed. The distribution of the peptic cells in the glands is well shown in fig. 6, which is a sketch of part of a vertical section from the middle of the peptic region as seen under a low power. The preparation was stained with aniline blue, according to Heidenhain's directions†; the peptic cells become much more deeply stained by this than the rest of the tissue, and the limit of their distribution can be readily made out. They are seen to be absent near the orifices of the glands, where the tubes are lined with columnar epithelium.

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* Untersuchungen, 1871.

† Arch. f. mikr. Anat. vi. 1870.

The relation of the peptic cells to the central cells is best seen in the horizontal sections (as in fig. 8, which is taken from the *Dorcopsis* stomach). Here the peptic cells (*p*, *p*) lie immediately outside the central cells (*c*, *c*) (which almost fill up the tube, leaving but a very small lumen) and in close contact with them. But in *Macropus* the contact is not so close; for the basement membrane of the gland sends horizontal lamellar projections inwards, partially surrounding the spheroidal cells and separating them more from the central ones.

It can be clearly made out (both in vertical sections showing the glands along their whole length, and in sections carried obliquely across them so that in different parts of the section different levels of the tubes are cut) that the central cells are directly continuous at the neck of the glands with the gradually shortening columnar cells of the gland-mouth, and resemble, therefore, in this respect the cubical cells which line the greater part of the tubes of the second region*. In general aspect too the central cells resemble those; but they are for the most part, as before mentioned, smaller and more angular and closely packed. This is especially the case at the base of the gland, where the cells almost entirely fill the tube so as to leave little or no lumen (fig. 9).

Transition between the Second and Third Regions.—The line of demarcation between these is best marked, as before stated, in *Dorcopsis*, where there is a slight furrow between them, the mucous membrane increasing rapidly in thickness on the peptic side of the furrow. A section across the line and including a part of each region, is shown in fig 10, as seen under a low power in a preparation stained with aniline blue. The glands of the second region become gradually shorter until opposite the bottom of the furrow, where they are shortest; those beyond rapidly increase in length, but exhibit at first exactly the same structure. At about the third or fourth row, however, a few peptic cells become superadded to the others about the middle of the glands; and these increase in number and occupy a greater length of the gland as we proceed further into the third region, until after a few more tubes they are found throughout the greater part of the length of the glands; so that from a study of the mode in which the two kinds of glands pass into one another, as well as from a comparison of their structure, it is clear that the main parts of the glands of both regions are almost precisely similar and will probably have a similar function, and that the only difference of importance lies in the fact of the superaddition of the peptic cells in the glands of the third region—probably implying the superaddition of some other function in these glands. Whether this, as is generally believed, is the elaboration of pepsin, we hope that before long the results of some comparative experiments already commenced will enable us to form a definite opinion.

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* Strictly speaking, these cells are not cubical; for although they appear so when the glands are seen longitudinally, they must of course, as seen in a transverse section of the glands, become narrower towards the lumen; so that the shape of each cell is in reality that of a truncated wedge.

In the foregoing account we have been induced to enter into what might seem almost unnecessarily minute details with reference to the structure of the gastric mucous membrane in these particular animals, because, as we have already incidentally mentioned, they seemed to us especially well adapted for investigation, partly on account of the well-marked differences between the glands of different regions, combined at the same time as they are with many unmistakable features of similarity, partly on account of the ease and certainty with which the regions can be mapped out, and partly also on account of the simplicity of form of the glands, which renders them easy of observation throughout their whole length.

The identity between the glands of the third region here described and the well-known *peptic glands* of the stomach has been already incidentally noticed, and is sufficiently obvious. It will doubtless also have suggested itself to most of our readers that the glands here described as occupying the second region in the Kangaroo's stomach, and consequently by far the larger portion of the glandular mucous membrane, resemble in most points of structure those which were until the last few years known as the *mucous glands* of the stomach of Man and the higher Mammalia. But the resemblance is more obvious, both as regards situation and structure, in the part of the second region which is near the pylorus, than in the remainder. In the latter the epithelium of the glands presents peculiarities which have not hitherto, it is believed, been noticed in the gastric glands of other animals. These peculiarities are not improbably connected with the nature of the food on which the Kangaroo subsists. Further investigation is necessary to show to what extent they are found in other animals in which the food is similar.

DESCRIPTION OF THE PLATES.

Plate VIII.

Fig. 1. Vertical section of the mucous membrane of the stomach of *Macropus giganteus*, carried across the line of junction between the first and second regions. Magnified about 135 diameters. *A*, end of first region or region of stratified epithelium; *B*, commencement of second region; ×, junction of the two; *S*, stratified epithelium; *p*, *p*, papillæ of corium rising up into this; *c'*, lowermost columnar cells of the Malpighian layer of the stratified epithelium; *h*, horny layer of ditto; *ly*, lymphoid corpuscles between the cells of the Malpighian layer; *gl*, tubular glands of mucous membrane of second region; *o*, *o*, their orifices; *c*, columnar epithelium of the surface; *i*, *i*, interglandular tissue with numerous lymphoid cells; *m.m*, muscularis mucosæ; *v*, blood-vessels cut across.

Plate IX.

Fig. 2. Vertical section of a part of the second region of the mucous membrane, showing three of the tubular glands, of *Macropus giganteus*. Magnified

about 260 diameters. *n*, neck, *m*, middle part, *b*, fundus, *o*, orifices of the glands; *c*, columnar epithelium of the surface continued into the mouths of the glands; *m.m*, muscularis mucosæ; *v*, *v*, blood-vessels cut across.

Fig. 3. Vertical section of part of a lymphoid patch, from the stomach of *Macropus giganteus*, showing three of the tubular glands. Magnified about 260 diameters. *o*, *o*, orifices of the glands; *c*, columnar epithelium of the surface; *n*, neck, *m*, middle part, *b*, base or fundus of the glands; *m.m*, muscularis mucosæ; *s.m*, submucosa; *l.t*, lymphoid tissue.

Fig. 4. Section of a nodule or follicle from lymphoid patch of stomach (*Dorcopsis luctuosa*). Magnified about 60 diameters. *F*, follicle; *d*, depression or pit in the mucosa over the follicle; *gl*, glands of the mucosa with lymphoid tissue between them and at their base; *m.m*, muscularis mucosæ; *s.m*, submucous areolar tissue with lymphoid tissue near muscularis mucosæ; *l.s*, lymphatic sinus at base of follicle.

Plate X.

Fig. 5. Vertical section of mucous membrane of second region of stomach near the pylorus (*Macropus giganteus*), showing six of the tubular glands. Magnified about 135 diameters. *c*, columnar epithelium of the surface; *o*, *o*, orifices of the glands; *l*, *l*, lymphatic vessels in the interglandular tissue of the mucous membrane; *m'*, *m'*, bundles of plain muscular tissue passing up between the bases of the glands from the muscularis mucosæ, which is not represented in this figure.

Fig. 6. Vertical section of the third or peptic region of stomach (*Dorcopsis luctuosa*). Magnified about 60 diameters. *p*, part of the glands which contain peptic or delomorphous cells; *b*, bases of the glands destitute of these; *m.m*, muscularis mucosæ.

Plate XI.

Fig. 7. Middle part of three tubular glands from vertical section of peptic region of the stomach (*Dorcopsis luctuosa*). Magnified about 260 diameters. *p*, *p*, peptic cells; *c*, *c*, central or adelomorphous cells.

Fig. 8. Horizontal section of peptic region at level of middle of the glands (*Dorcopsis luctuosa*). Magnified about 260 diameters. *p*, *p*, peptic cells, *c*, *c*, central cells, *b.m*, basement membrane of glands; *v*, *v*, capillary blood-vessels cut across in the interglandular tissue.

Fig. 9. Base or fundus of one of the peptic glands, seen to be occupied entirely by the angular central cells (*Dorcopsis*). Magnified about 260 diameters.

Fig. 10. Section across the line of demarkation between the second and third regions of the gastric mucous membrane (*Dorcopsis luctuosa*). Magnified about 60 diameters. *B*, mucous membrane of the second region; *C*, mucous membrane of third or peptic region; × ×, depression at the junction between the second and third regions; *p*, parts of the glands of the third region which contain the peptic cells; *m.m*, muscularis mucosæ.

Figs. 1, 2, 3, 4, and 5 are from preparations which had been coloured with logwood-alum; figs. 6, 7, 8, 9, and 10 from sections stained with aniline blue. In figs. 6 and 10 the outlines of the glands are only roughly indicated.

February 1, 1876.

G. R. Waterhouse, Esq., V.P., in the Chair.

The Secretary read the following extract from a Report by Commander Cookson, R.N., of a visit by H.M.S. "Peterel" to the Galapagos Islands in July 1875, which had been communicated to him by the First Lord of the Admiralty:—

"A notice of these islands would be incomplete without some reference to the Tortoises for which they are so famous, and from whom they derive their name.

"These animals are extinct in Charles Island; and only a very few individuals are supposed to survive on Chatham Island. In Hood, James, and Indefatigable Islands the numbers are so reduced that they are no longer hunted, the few left being in the most inaccessible parts of the islands; and I was assured that a search of a fortnight might not result in finding a single individual on either of these islands. Albemarle and Abingdon are the only remaining islands in which they have ever been found. In parts of Albemarle Island they are still very abundant, especially at the south-east end.

"They are still tolerably numerous near Tagus Cove. Landing a party of twenty-four men about half a mile south-east of Tagus Cove, we found in a few hours thirty tortoises: the three largest weighed respectively 241 lb., 185 lb., and 173 lb.; these, I was told, were as large as they are commonly found now.

"Tagus Cove is a favourite resort of whalers for the purpose of getting Tortoises. The anchorage is perfectly secure; and the custom is for almost the entire crew to be landed until as many Tortoises are secured as can conveniently be taken on board, some whalers going to sea with as many as 100.

"We found a good trail leading from the landing-place (at one of the gullies before mentioned as having pools of fresh water at its mouth) to the ground where the Tortoises are found, a distance of about three miles; quantities of Tortoise shells, and traces of fires showed the numerous camping-grounds.

"Tortoises were never, I believe, very abundant on Abingdon Island; our searching party found four on this island. They were on the high ground; and it was a work of great labour getting them down to the boats. The distance was about four miles; but the ground was exceedingly rugged, and covered with thick brush, through which a trail had to be cut for the entire distance. The largest found on this island weighed 201 lb., and the smallest 135 lb.

"In consequence of the extent of Albemarle Island, and the inaccessibility of many parts of it, I have no doubt these animals are still very numerous on it, and are likely to be so for a long period even at the present rate at which they are destroyed; but I have already shown the havoc made amongst them by the oil-makers. This is the cause of their being nearly extinct on James and Indefatigable

Islands, where they used to be so numerous. Admiral Fitzroy found a party on James Island making oil in 1835.

"In Abingdon Island, where they are not numerous, I believe they are doomed to destruction directly the orchilla-pickers are placed on the island; for a party of sixty or eighty men will soon hunt over this small island, and discover every individual on it. The meat is highly esteemed by the inhabitants; we found it rather tough and stringy; but it makes excellent soup.

"The tameness of the birds on the islands has been frequently noticed; it is certainly very remarkable, especially in Charles and Chatham Islands, which have been so long inhabited; the small birds of all kinds are so tame that they are easily knocked down with a switch; some of the men killed numbers of doves in this manner.

"The rocks at Iguana Cove were thickly covered with the hideous black Iguanas mentioned by Admiral Fitzroy. We found them in numbers at the other places we visited, but nowhere else so numerous or so large in size. Here they were found to weigh from 20 to 22 lb., against 12 to 14 lb. from other localities."

Mr. Frederick Selous, Jr., exhibited a series of horns of African Rhinoceroses in illustration of Mr. Drummond's paper read at the last Meeting of the Society.

These horns had been obtained in various localities in eastern Africa, and consisted of the following specimens:—

1. *R. bicornis major* ♂. Shot at Tamasanka, Nov. 19, 1874, about lat. 19° 50′ S., long 26° 10′ E.

2. *R. bicornis major* ♀. Shot near the river Gwai, September 1873, about lat. 18° 50′ S., long. 27° E.

3. *R. keitloa* ♂. Shot on the southern edge of the marshes of the Chebe river, August 28, 1874, about lat. 18° 30′ S., long. 4° 50′ E.

4. *R. simus* ♀. Shot on the border of the hills between the Gwai and Zambesi rivers, May 1874, about lat. 18° 40′ S., long. 26° 30′ E.

5. *R. simus* ♀. Shot Oct. 1872, near the river Sech Wechive, north-east of the Matabili country, about lat. 18° 30′ S., long. 29° 50′ E.

6. *R. simus* ♀. Shot Nov. 15, 1874, about lat. 19° S., long. 26° E.

Mr. Sclater read the following extract from a letter addressed to him by Mr. Albert L. C. Le Sœuf, Hon. Secretary of the Zoological and Acclimatization Society of Melbourne, Australia:—

"I send you the horn of a Deer we have in our gardens, and I shall be much obliged if you can let me know what variety it is. cannot find it described anywhere, although I do not doubt it will be familiar to you. The Deer were sent here some years ago by Sir Henry Barkly, from the Mauritius. In appearance it is like the Sambur Deer, but smaller, say about three feet high or rather under. The colour of the hair is rather lighter than in the Sambur; the ears are not so large. The does breed freely every year with us. We have liberated some in the bush, and given others away."

Mr. Sclater exhibited the horn in question, and said that it appeared to belong to *Cervus rusa*, originally of Java, but which was known to have been introduced thence into the Mauritius many years ago (see Blyth, Ibis 1862, p. 92).

Mr. Sclater thought it desirable that the facts of this transportation should be placed upon record, as this Deer might probably become a denizen of Australia, as had been already the case in Mauritius.

The following papers were read:—

1. On the Position of the Anterior Nasal Apertures in *Lepidosiren*. By T. H. Huxley, Sec. R.S.

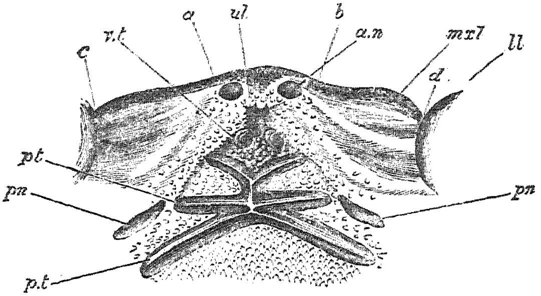
[Received January 7, 1876.]

In the course of the discussion which followed my paper on *Ceratodus*, read before the Society on the 4th of January, reference was made to the position of the anterior nasal apertures in *Lepidosiren*; and they were affirmed to be within the mouth, inasmuch as they are situated between the upper and the lower lips.

The anterior nasal apertures correspond with the primitive openings of the olfactory sacs, which, in all known Vertebrata, are invariably developed from the integument of the under aspect of the head, in front of the region which forms the roof of the oral cavity: and, in all the vertebrated animals in which I had specially studied the question, I had found the anterior nasal apertures to be situated in front of the upper lip and therefore outside the mouth. That they should be situated behind, or below, the upper lip, and therefore inside the mouth (so far as the cavity included between the lips may be properly called the mouth), appeared to me to be a singular anomaly, the existence of which, however, I was not prepared to dispute without reexamination of the facts. The point is, in various respects, of so much interest that I have lost no time in making the requisite investigation, with the result of leaving no doubt whatever in my mind that in *Lepidosiren*, as in *Ceratodus*, the anterior nasal apertures are truly outside the mouth, not only in the sense of lying beyond the contour of the mandible, when this is shut against the palate, but in the sense of being situated on the underside of the head in front of the upper lip, and therefore altogether beyond the limits of any permissible definition of the oral cavity.

When the mouth of a *Lepidosiren* (*L. annectens*) is laid open from below, and the palate and the contour of what has hitherto been termed the upper lip (Fig. p. 181, *c a b d*) are displayed, the latter is seen to present a median portion (*a b*) separated by a slight undulation from the two lateral prolongations *c a* and *b d*. The latter are the edges of the fold which overhang the mandible on each side when the parts are undisturbed. They occupy the maxillary region of the head, and may be termed the *maxillary lips.*

The median portion of the anterior contour (*a b*) does not belong to the lips at all, but corresponds, as is easily seen in a section of the skull, with the anterior extremity of the chondrocranium and the ventral edges of the nasal capsules. The line *a b* is, in fact, the anterior contour of the head; and the pigment-cells of the dorsal integument are here continued onto the ventral face. After a very short distance, however, the integument terminates in a slight, transverse, papillose ridge, which forms the anterior boundary of a shallow median depression; on each side of the hinder part of this depression is one of the vomerine teeth (*v.t*).



Under view of the fore part of the roof of the mouth and underside of the head of a young specimen of *Lepidosiren annectens* (×3). *a b*, anterior margin of the head; *a c*, *b d*, right and left maxillary lips: *a.n*, anterior nasal apertures; *p.n*, posterior nasal apertures; *u.l*, præmaxillary lip; *v.t*, vomerine teeth; *p.t*, palatine teeth.

The anterior nares (*a.n*) lie immediately behind the anterior contour of the head; and their more prominent posterior lips lie in front of a transverse line drawn through the edge of the papillose ridge. It is obvious that the area included between the anterior contour of the head in front, the median fossa behind, and the anterior nares at the sides, corresponds with the region occupied by the naso-frontal process in the vertebrate embryo and with the homologous large, shield-shaped, naso-frontal integumentary plate in the Rays and Dogfishes. The papillose ridge (*u.l*) is therefore the middle or premaxillary portion of the upper lip; and if this be so, it follows that the anterior nares in *Lepidosiren* are placed as in Chimæroids and Plagiostomi, on the under aspect of the head and outside the mouth.

I may add that *Lepidosiren* has two upper labial cartilages—one fibro-cartilaginous immediately behind the anterior nasal aperture, and the other behind the posterior nasal aperture. These answer to the upper labial cartilages in *Chimæra* and *Cestracion.*

2. Notes on the Myology of the Limbs of *Moschus moschiferus*. By F. JEFFREY BELL, Exhibitioner of Magdalen College, Oxford. Communicated by Prof. FLOWER, F.R.S., V.P.Z.S.

[Received December 31, 1875.]

By the kindness of Prof. Flower, I have been enabled to dissect the muscles of the fore and hind limbs of *Moschus moschiferus*, an animal which has been lately made the subject of a monograph by Prof. Flower, presented by him to the Society (P. Z. S. March 16th, 1875). The interest of any new facts that can be brought forward concerning this Deer will be evident to all who heard or have read his paper.

In examining the myology of the limbs, I have dissected the corresponding parts in *Cervus virginianus* (kindly sent me by Mr. A. H. Garrod), *Tragulus*, sp.? (from the store-room of the Royal College of Surgeons of London), and a common Sheep. I have also been able to make comparisons with the myology of the same parts in *Hyomoschus*, thanks to a paper published by M. Chatin in the 'Annales des Sciences Naturelles'*.

Unfortunately, both in the copy of Cuvier's 'Planches de Myologie' which I saw through the kindness of Mr. Garrod, and in that belonging to the Library of the Royal College of Surgeons, there were no plates of the muscles of a sheep, ox, or deer; but a full description of those of the first two can be found in Chauveau's 'Comparative Anatomy of Domesticated Animals,' which is now easily accessible; and for this reason I have thought it unnecessary to describe, at any length, such muscles as offer no important variations from what we find in the Sheep; in the same text-book will also be found all the more common synonyms of the muscles—a most necessary assistance to myologists in the present confused state of nomenclature.

In the hind limb of *Moschus*, as it came into my hands, the femur was removed. The muscles of the humerus are not described in this paper; but the more striking differences are only found in the arrangement of those muscles which send tendons to the digits.

I. *Fore limb.*

A. Muscles inserted into the metacarpus.

α. Anterior face.

(1) Extensor metacarpi anterior.
(2) ,, ,, obliquus.

In the arrangement of these muscles there was no important variation from that which obtains in the same parts in the sheep and deer dissected.

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* "Observations sur la Myologie de l'*Hyomoschus*," *loc. cit.* 5e sér. Zoologie et Paléontologie, tom. xv. (1872).

In *Tragulus* a similar arrangement obtains. In *Hyomoschus*, however, Chatin notes three muscles in this region, which he names *extenseur gros, extenseur grêle*, and *adducteur*. The *adducteur* appears to be the same as the oblique extensor, so far as one can judge from Chatin's account; he does not, however, note the oblique direction of its tendons, which seems to be universal among the Ungulata, as it is found in *Equus, Ovis, Cervus*, and *Sus*.

The anterior extensor arises by two heads barely separable from one another, on the outer face of the distal portion of the humerus; and from Chatin's description and figure I am led to suppose that he has divided this, which is really one muscle, into a portion "gros," and a portion "grêle."

The tendon is only double at its distal extremity, where it widens, and becomes bifid, to embrace both sides of the tuberosity of the metacarpus.

β. Posterior face.

(1) Flexor metacarpi internus.
(2) „ „ obliquus.
(3) „ „ externus.

Here, again, there is no important variation; but we may note that the outer branch of the bifid tendon of the external flexor (3) is inserted into the tuberosity on the external side of the metacarpus, which appears as the proximal end of the fifth metacarpal, united to the rest of the bone in this region, and only represented distally by a short, fine needle of bone; a similar insertion of the tendon was seen in *Cervus virginianus*; in the Sheep the ending is more towards the median line of the metacarpus, while in *Tragulus, Hyomoschus*, and the Pig this branch is attached to the head of the entire fifth metacarpal.

B. Muscles inserted into the phalanges.

α. Anterior face.

In the arrangement of the tendons of muscles going to the digits, *Moschus* differs not a little from *Cervus virginianus*, or the Pig. In the former, as in the Sheep, we find that there are three muscles having their insertions in the digits, namely:—

i. Extensor communis, with tendons to the third phalanges of the median digits.
ii. Extensor digiti interni (tertii).
iii. „ „ externi (quarti).

Both of these have two branches—one to the second phalanx, and one directed backwards and ending in the plantar cushion—but no tendons going to the lateral digits, although those ending on the plantar surface, as just described, probably represent what remains of them.

C. virginianus, in addition to the muscles common to it and the Sheep, possesses an extensor dig. minimi.

In the Pig the digits are all supplied from the common extensor, by its division into four branches; while the extensor dig. interni, further, is inserted into both the internal digits, and the fifth possesses a proper extensor dig. minimi.

Now in *Moschus* each digit is provided with an extensor; but the so-called *common extensor*, as in *Cervus*, sends out only two branches, and these for the median digits, into whose third phalanges they are inserted. The internal extensor is inserted into the first phalanx of the third digit, on its anterior face, and the third phalanx of the second, on its inner face. The external extensor is inserted into the outer sides of the second phalanx of the fourth, and of the third phalanx of the fifth digit. A small *extensor dig. minimi* is also present, and is inserted into its second phalanx, after crossing the extensor of the fourth digit, in the last or distal third of the metacarpus, as in *C. virginianus*, as already described, though not as in the Sheep, where this muscle is absent.

In *Tragulus* the common extensor is inserted only into the median digits; but in *Hyomoschus*, as Chatin says, the arrangement is Porcine; that is, the common extensor is inserted into all four digits.

As in the Sheep and Pig, the extensors of the phalanges arise on the outer side of the radius, and from the external tuberosity of the humerus; their tendons passing together along a deep groove on the outer face of the distal end of the radius, in a strong fibrous sheath, are directed, according to their destination, more or less inwardly along the anterior face of the metacarpus. Separated from these, however, is the tendon of the internal extensor, the fleshy body of which lies on the flattened outer face of the ulna, while the tendon itself, more deep, has a separate carpal sheath; when it has passed through this, it widens, but does not bifurcate till it approaches the distal end of the metacarpus.

β. Posterior face.

(1) Perforatus } flexors of the digits.
(2) Perforans }

The short flexor of the fifth digit, which is found in the Pig and *Hyomoschus*, is absent.

In no known Ungulate does the *perforatus* send tendons to the lateral digits, but only to the second phalanx of each median digit. In all members of the group its fleshy portion consists of two masses of muscle, arising beneath the *flexor metacarpi obliquus*, from the internal condyle of the humerus; in the Sheep these two tendons, arising from the two muscular masses, one from each, unite in the metacarpal region, and, more distally, bifurcation occurs; in *Cervus virginianus*, the two tendons remain separate, as also in the Pig and *Hyomoschus*. In *Moschus*, however, there is a certain union of the tendons, by means of a fine slip of tendon running from the inner to the outer branch, in the metacarpal region.

The *perforans*, as in the Horse, Sheep, and Pig, consists of three muscular portions, called by Chauveau epitrochlean, ulnar, and radial, from each of which a tendon arises; these three tendons unite into one, strong and deeply situated, at the carpus.

In the Sheep and *Cervus*, only two branches are formed by this tendon, one for the third phalanx of each median digit; but in *Moschus*, shortly before reaching the metacarpo-phalangeal region, there is given off from each side a delicate tendon, which is inserted into the third phalanx of the second and fifth digits respectively; while the remainder, scarcely diminished in size, passes through the sheath afforded it by the tendons of the perforatus, shortly after its own bifurcation.

A similar arrangement obtains in *Hyomoschus*, according to Chatin; in the Pig, however, the perforans is divided into four distinct branches. There are no lumbrical or interosseous muscles, as might be inferred from the structure of the bones of the manus. *Hyomoschus* has one lumbrical and four interossei, as the Pig.

II. *Hind limb.*

The femur, as already stated, was removed, so that it was impossible to note the origins of several muscles, as had been done in the fore limb; but I saw nothing to lead me to suppose that there was any variation from that which ordinarily obtains among Ruminants.

On removing the skin and fascia, it was very easy to separate, on the posterior side of the leg, in the tibial region, a large triangular mass of muscle, terminating in a tendon, which seemed to be inserted into the head of the process of the calcaneum, and then to pass on to the digits. Such an appearance is common enough in the hind limbs of Ungulates, and seems to have given rise to Prof. Owen's remark that the gastrocnemius sends a tendon to the digits*—the fact being, indeed, that the tendon which thus crosses, as described by Owen, over the calcaneum, but which is not inserted into it, is that of the *plantaris* muscle, the arrangement of which was clearly pointed out by Meckel†, in speaking of the Horse:—

"Chez les solipèdes le *plantaire grêle* et le *court fléchisseur commun* sont confondus; ou, si l'on veut, le dernier est avorté.... Le tendon du muscle se dirige d'abord au devant de celui du triceps de la jambe [*i. e.* the gastrocnemius and soleus]; arrivé au calcanéum, il se place derrière ce tendon, s'epanouit et s'insère à la grande apophyse de cet os‡; puis il se prolonge en avant."

By others, again, the soleus has been considered the muscle from which the perforated tendon arises, as Chatin says§:—

"D'après plusieurs auteurs, Stannius entre autres, le soléaire manque rarement chez les Mammifères ; mais en général, au lieu de contribuer à la formation du tendon d'Achille, il se terminerait par un tendon propre, qui chez les Ruminants, le Cochon, et le Chien, se diviserait pour se rendre aux orteils, de sorte que ce muscle jouerait le rôle d'un court fléchisseur des orteils, outre celui qui lui est ordinaire.

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* "The chief peculiarity of the flexors of the digits of the hind foot in hoofed quadrupeds is the accession of muscles not so applied in other mammals. Thus the 'gastrocnemius,' besides its insertion into the heel-bone, sends a strong tendon along the back of the metatarsal, to the phalanges, where it expands and bifurcates, each division again splitting for the passage of that of the 'flexor perforans' before being inserted into the middle phalanges."—*Anat. of Vertebrates*, vol. iii. p. 46.

† Anat. Comp. French ed. vol. vi. p. 442.

‡ It would be more correct to say that at this point the tendon is surrounded by a fibrous cap, inserted into the bone, which it has itself formed.

§ *Loc. cit.*

"Dans l'*Hyœmoschus*, cependant, pas plus que dans le *Cervus mexicanus*, une pareille duplicité de fonction ne saurait être attribuée au soléaire, car le fléchisseur des orteils qui glisse sur la face postérieure du calcanéum, comme sur une poulie de renvoi, en est bien distinct. Cuvier n'indique, d'ailleurs, nullement ce mode de terminaison du soléaire se prolongeant jusqu'aux orteils pour en former le fléchisseur superficiel."

It may, then, I think, be fairly concluded that the tendon which is perforated in the hind limb of Ungulates, is that which arises from the *plantaris*; and this is the view taken by Prof. Huxley [*] and by Mr. Mivart [†].

A. Muscles inserted into the tarsus.

α. Anterior face. None.

β. Posterior face.

(1) Gastrocnemius.
(2) Soleus.

These two muscles ordinarily unite their tendons before being inserted into the calcaneum, and therefore have been described, chiefly by French anatomists, as in the above quotation from the French edition of Meckel, as one muscle, under the name of the *triceps of the leg*; for the gastrocnemius has two heads. But in *Moschus*, as in *Tragulus*, the tendons of the two muscles are easily separable for their whole extent, but a muscular branch unites their fleshy bodies.

The soleus is present in *Hyomoschus*, but absent in the Pig.

B. Muscles inserted into the metatarsus.

α. Anterior face.

(1) Extensor metatarsi internus.
(2) ,, ,, anterior *sive* medius.
(3) ,, ,, externus.

The median and internal flexors pass, with the common extensor of the digits and the extensor of the fourth digit, through a highly fibrous tarsal ring. The flexor internus is larger at its origin than in the Sheep ; but in both animals, as also in *C. virginianus*, it arises both from the head of the tibia and from the strong ridge on the anterior face of the same bone. Chatin makes the vague observation concerning this muscle, that it is "assez dissemblable chez le *Cervus mexicanus* comparé à l'*Hyœmoschus*." I observed no variation in its arrangement in *Moschus* from that which obtains in *C. virginianus* ; and the only point in which it differs from the arrangement in the

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[*] Anat. of Vertebrata, p. 56.

[†] Elementary Anatomy, p. 354.

Pig is, that it terminates on the proximal end of the metatarsal, instead of on the second cuneiform.

The *extensor metatarsi anterior*, and the *extensor digitorum communis* are barely separable in the muscular portions, as in the Sheep, Deer, *Hyomoschus*, and the Pig. The external extensor crosses over the tarsus, in close company with the proper extensors of the fourth and fifth digits; in the Sheep, as might be supposed, and in *C. virginianus*, the proper extensor of the fifth is absent. Save in this particular, there is no variation in the arrangement of this external extensor in Ruminants from that which obtains in the Pig.

β. Posterior face of the metatarsus; no muscles are inserted into it.

C. Muscles of the digits.

α. Anterior face.

(1) Extensor digiti quinti.
(2) „ „ quarti.
(3) „ digitorum communis.
(4) „ digiti tertii.

(1) The tendon of this muscle is in close proximity to that of the extensor dig. quarti, till it approaches the phalangeal or distal end of the metatarsus, where it widens, separates from it, and is inserted into the third phalanx of the fifth digit. It is absent in *C. virginianus*, as in the Sheep.

(2) This muscle terminates by a broadened strong tendon, on the second phalanx of the fourth digit, as in the Sheep, *Cervus*, *Hyomoschus*, and the Pig.

(3) The *common extensor* has only two branches, which end in the third phalanges of the median digits, as in *Cervus virginianus*; but the same muscle has four branches in *Hyomoschus*, as in the Pig—though only two in *Tragulus*, as in the manus.

(4) In close connexion with the common extensor arises the extensor of the internal digit, which terminates in the second phalanx of the third, and the third phalanx of the second digit. No branch for the second digit was found in *C. virginianus*; but the lateral digits of the pes have no metatarsal bones at all, although there are small metacarpals in the manus.

Chatin notes no internal flexor in *Hyomoschus*, which is strange, as the muscle is found in the Pig and in *Tragulus*, as well as in the Sheep and *Cervus*.

β. Posterior face.

(1) Perforatus.
(2) Perforans.
(3) Flexor obliquus.

The *perforatus* muscle has been already spoken of; it only now remains to be added that it has only two branches, as in the manus.

The *perforans*, again, has but two tendons, and those for the median digits, whereas, it will be remembered that, in the manus, the lateral digits also received tendons from this muscle; but the lateral toes of *Moschus*, in the pes, are much smaller than those in the manus, and the metatarsals are absent, as has been pointed out by Prof. Flower. In *Hyomoschus*, and the Pig, tendons are sent to all four digits.

The tendon of the oblique flexor, after having passed through the strong fibrous sheath found on the inner side of the tarsus, becomes directly afterwards united with that of the perforans; in the Sheep the union takes place somewhat lower down the metatarsus, in *Cervus* at about the same spot.

D. Muscles of the pes.

The *pedal* is a small muscle, arising from the inner face of the calcaneum, and attached to the tendon of the common extensor; it has no attachment to the inner extensor as in the Sheep and Deer; nor has it two branches for attachment to the two tendons of the common extensor as in *Hyomoschus* and the Pig. There are no *interosseous* muscles, of which there are four in *Hyomoschus* and the Pig.

SUMMARY.

The most interesting points in the foregoing description are those which refer to the arrangement of the tendons inserted into the digits.

i. They are interesting morphologically, as showing what was the arrangement in the common ancestor of the true Cervidæ and of *Moschus*—namely, that the extensor communis digitorum had only *two* tendons, and those for the median digits; for the same character obtains in *Tragulus*; while they offer a further proof of Prof. Flower's positions:—(*a*) That *Moschus* has close affinities to the true Cervidæ; for this same arrangement seems to be constant throughout the group, although different in *Hyomoschus**. (β) That *Moschus* is an older and more generalized form; inasmuch as it still possesses tendons for the lateral digits, arranged in the same manner as in *Tragulus*.

The absence of flexor tendons, arising from the *perforans*, and inserted into the lateral digits of the pes, may cause further stress to be laid on the small size or complete absence of the metatarsals, which is so highly characteristic of the Cervidæ.

ii. They are interesting physiologically, as showing how the Musk-Deer managed to hold on to the rocks and crags of its home by all four toes, in the manner described in Prof. Flower's paper.

It will not, I trust, be long before we know what arrangement obtains in the Reindeer, in *Hydropotes*, and others. I trust that the evidences adduced on the subject of the homology of the perforated tendon of the pes in the Ungulata, may settle this question, so far, at any rate, as the gastrocnemius is concerned.

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* The vagueness of some parts of M. Chatin's description demands a reconsideration of the myology of *Hyomoschus*.

3. On the Anatomy of *Chauna derbiana*, and on the Systematic Position of the Screamers (*Palamedeidæ*). By A. H. Garrod, M.A., F.Z.S., Prosector to the Society.

[Received January 5, 1876.]

(Plates XII.–XV.)

In his memoir "on the systematic position of the Crested Screamer (*Palamedea chavaria*)," published in the 'Proceedings' of this Society*, Prof. Parker has placed that bird among the Anseres, and away from the Rallidæ, with which it had been generally associated. In his "Classification of Birds"†, Prof. Huxley adopts the same view as Prof. Parker. Both these distinguished authorities base their opinions on anatomical considerations; it therefore behoves me to attempt to substantiate the different views expressed by me in my paper "on certain muscles of Birds, and their value in Classification"‡, as it is so considerably at variance with that of the authorities just mentioned.

The great extent to which the skeleton is permeated with air renders the features presented by the different bones of *Chuna* less distinctive than in the majority of birds. For this reason the soft parts will be first considered.

Cutaneous System. Pterylosis.—Nitzsch has described the pterylosis of *Palamedea cornuta* and *Chauna chavaria*; and, as might be expected, *C. derbiana* does not differ in any important particulars from the latter. As he remarks, the most striking point observed in the plucked bird is the extreme whiteness of the surface, which depends on the fact that the skin is almost universally emphysematous to the depth of nearly a quarter of an inch. On pressing with the finger, the characteristic crackling of a tissue filled with air is most marked, the only places in which it is absent, or nearly so, being the anterior surfaces of the upper ends of the tibia, and, to a less degree, two triangular spaces, equilateral, with their bases towards the middle line, situated one on each side over that part of each pectoral region which is near the head of the humerus, in the apex of the larger triangular surface bounded by the superior and axillary margins of the great pectoral muscle.

In the Gannet and the Pelican the skin is likewise emphysematous, but not exactly in the same way. In them the superficial surface of the cutis forms a plane surface, and the deep layer another, with the air-cells intervening between them, and the feather-quills traversing them. In *Chauna*, however, these two cutaneous layers are not definable, the whole presenting the appearance as if a non-emphysematous skin had been forcibly blown up, so as to cause its surface to be irregular and bubbled, more like an artificially distended mammalian lung than any thing else. The feathers and the semiplumes do not perforate the air-cells, but cause the skin to be indented where they are situated.

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* P. Z. S. 1863, p. 511. † P. Z. S. 1867, p. 415. ‡ P. Z. S. 1874, p. 117.

The disproportionately massive appearance of the legs is also caused by the presence of air beneath the tessellated skin, which extends almost to the ungual phalanges of the toes.

The contour-feathers, many of them, possess a very feeble after-shaft, especially in the region of the nape, as found by Nitzsch in *C. chavaria*; and there is also a slight groove along the posterior surface of the rhachis of each.

The rectrices are twelve in number.

There are twenty-six remiges in one of my specimens; Nitzsch and Sundevall find twenty-seven. Of these ten are primaries, the fourth being the largest. Of the sixteen secondaries the distal twelve are subequal, whilst the proximal four decrease in size as they approach the elbow.

The tufted oil-gland is not strikingly large; it is somewhat flat, with a single orifice on each side, surrounded by a circle of half-inch feathers which constitute the tuft.

The tibio-tarsus is nude for its distal third, being there covered, as over the tarso-metatarse and digits, with small red polygonal scales.

The plumage is uninterrupted, there being no spaces without contour-feathers except the axillary cavities mentioned by Nitzsch, in which down-feathers only are to be found. The down-feathers are universally distributed. The nude neck-ring of *C. chavaria* is absent in *C. derbiana*. The feathers of the humeral tracts are considerably the strongest of the contour-feathers.

Looked at in its entirety the pterylosis of the Screamers is unique, and in no way approaches that of the Anserine birds.

Alimentary Canal.—The *palate* is elongate and triangular, with three longitudinal rows of papillæ, which are conical, large, and therefore comparatively few in front, smaller and more numerous behind. They all tend somewhat backwards.

The *tongue* is just over an inch long, and $\frac{3}{8}$ of an inch broad, its sides being parallel for nearly their whole length. The tip is obtusely triangular, with a small papillary fringe at its extremity, $\frac{1}{8}$ of an inch broad. The base is straight, and is edged with spines $\frac{1}{10}$ of an inch long, and shorter, directed backwards. The surface and lateral margins are quite smooth, the whole organ being flattened, slightly grooved longitudinally down the centre, and nowhere more than $\frac{1}{8}$ of an inch thick. At its base are two lateral juxtaposed protuberances, rough on the surface, and together equal in area to one third of its surface. There is no transverse constriction or oblique groove like that found on the surface of the tongue in some Anatidæ.

The *œsophagus* is uniform in diameter, no crop being even indicated; it is not capacious.

The *proventriculus* is peculiar. It is more than usually capacious, and is glandular only in a patch which occupies but a small portion of its surface. This patch (which is clearly shown in the representation of this portion of the alimentary canal in Plate XII. fig. 1, at its upper end, where the proventricular dilatation ceases) has a narrow zonary belt of glands. It can, however, be seen that by far the majority of the glands are aggregated into a posteriorly situated patch. The only birds with which I am acquainted in which the proventricular glands do not form a zone, or an approach to one, are *Struthio* and *Rhea*. In the Gallinæ and Anseres they form a zone.

The glandular surface occupies a subelliptical space, 2 inches by 1⅜ in its long and short diameters, in the upper and back part of the canal, with the long axis in the direction of the tube. Its lower end is 2¾ inches from the upper orifice of the gizzard. The gland-tubes are simple, not racemose, and average ⅕ inch in length. The remainder of the area of the proventriculus, about five sixths of it, is covered with coarse and irregularly folded epithelium.

The *gizzard* is constructed on the usual type; it is decidedly small in proportion to the size of the bird (in the Anseres it is as conspicuously large), being much more elongate, narrow, and less muscular than in grain-feeders. Longitudinal folds plicate the triturating surfaces, which are smooth in the Geese, Ducks, and Swans.

The *spleen* is the size of a haricot bean, and of much the same shape. Its position is in no way peculiar; but, as in all birds, being placed *above* the gizzard, it tends to confirm the opinion that the latter organ is only the representative of the pyloric end of the stomach, the cardiac component of which is represented by the proventriculus.

The *liver* is composed of two simple rounded lobes, united by a narrow isthmus of hepatic tissue; the lobes are of nearly equal size; and there is a fairly voluminous gall-bladder.

The following table gives the intestinal lengths :—

	♂		♀	
	ft.	in.	ft.	in.
Small intestine............	7	3	6	10
Large intestine............	1	1	0	7
Cæca.....................	0	3	0	2

The *duodenum*, with its characteristic bend round the pancreas, is more capacious than the rest of the small intestine; but it is not large, being about ¼ inch in diameter. The hepatic and pancreatic ducts enter it at the bend, 2½ inches from the pylorus.

The pair of *cæca* present a condition unlike that found in any other bird with which I am acquainted. In that they are situated some considerable distance from the cloaca, they agree only with *Struthio* and *Rhea*. In the much larger Cassowaries the large intestine is not more than 7 inches long. In both *Apteryx* and the Tinamous, as well as in all other birds, the Anseres and Gallinæ included, the large intestine does not exceed 4 inches in length. *Chauna* in having a large intestine, the length of which is several times the diameter of the gut, agrees therefore with *Struthio* and *Rhea* only. These organs are figured in Plate XIII., they being opened up in fig. 1 to show their internal structure.

Instead of being smooth externally, the cæca are sacculated on two longitudinal bands. They are peculiarly capacious for their length, and fusiform in general outline. The sacculating bands are not lateral, but on their outer and inner borders, being continued from the longitudinal fibres of the large and the small intestine. Their mucous membrane is not plicated when they are distended. It is only, among other birds, in *Struthio* and *Rhea* that the cæca are sacculated; in these, however, there is only a spiral twist like that in the cæcum of the hares and rabbits.

Each cæcum has a well-developed special sphincter muscle guarding its aperture of communication with the intestine; and what is more peculiar still is, that they do not open into the colon proper, but into a special cavity, a continuation of the main intestinal tube, but separated off by a very constricting sphincter from the colon, as well as by the ileo-cæcal valve from the small intestine. This ileo-colic cavity is $\frac{3}{4}$ of an inch long and about $\frac{1}{2}$ an inch in diameter when undistended. Its mucous membrane is like that of the cæca, much more delicate than that of the colon. The ileo-cæcal valve is a small slit-like opening, nearly $\frac{1}{4}$ of an inch long, with its lips projecting a little way into the ileo-colic cavity. The two openings of the cæca into the same cavity are one on each side of it, a little oblique in regard to it, and considerably larger in lumen. The opening into the colon is very constricted; beyond it the mucous membrane of the large intestine is, as Dr. Crisp remarks*, transversely plicated, to produce an appearance much like coarse valvulæ conniventes.

Nothing like the above-described condition is to be observed in any other bird, not even in *Struthio* or *Rhea*, in both of which, as typically, the cæca enter the commencement of the uniformly cylindrical colon by fair-sized orifices, not surrounded by a special sphincter. This being the case, I cannot agree with Prof. Parker's remark† that "there is nothing whatever in the digestive organs, which are extremely voluminous, to separate the bird from the Geese."

Respiratory Organs.—Prof. Parker‡ remarks, "the trachea and inferior larynx are truly anserine; for there are no inferior laryngeal muscles, the contractors of the trachea ending one third of an inch above the bifurcation, and only a delicate fan-shaped fascia going to the half-rings. Moreover the trachea itself, from being flat and cartilaginous, becomes round and then compressed, and osseous an inch above the bronchi, so that it cannot be mistaken for any other than the trachea of an anatine bird." In that the lower end of the trachea is of smaller diameter than is the tube higher up, in that in the same part the constituent rings are in close contact without scarcely any intervening membrane, in that there are two pairs of tracheal muscles running to the thoracic parietes, and in that the intrinsic lateral tracheal muscles end before they reach the bifurcation of the bronchi, the syrinx of the Screamers approaches that of some of the Anseres; but in that there is no special modification of the organ in the male, and in the absence of chondrification or ossification of what are generally present as dilating rings or half-rings to the bronchi, the Screamers are not Anserine, and in the latter feature peculiar.

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* P. Z. S. 1864, p. 16.

† P. Z. S. 1863, p. 514.

‡ *Loc. cit.*

There is nothing remarkable in the rings of the windpipe, their interlocking producing the well-known key-pattern. The last two are greatly compressed laterally, so that the membranous bronchi, in each of which there are only a very few slender half-rings, arise quite close together. As can be seen from the figure, Plate XII. figs. 2, 3, 4, the lateral muscles of the trachea are peculiarly powerful; the upper extrinsic pair is inserted into the middle of the membrane which runs between the body of the coracoid bone and the corresponding limb of the furcula on each side; the lower close to the costal process of the sternum, at the back of the sterno-coracoid articular margin of the former bone. The intrinsic muscle on each side descends the windpipe to end by bifurcating opposite the origin of the sterno-tracheal muscle, and cease, its anterior portion higher than its posterior, six or seven rings lower down, some distance above the bifurcation of the bronchi. The above-mentioned extremely delicate nature of the commencing bronchial tubes is most peculiar.

The lungs present no special features of interest.

There are several myological characters which, though small in themselves, all go to form the exact definition of any group of birds, and aid in the determination of affinities. Among the more important of these are the presence or absence of the ambiens muscle* (which is of fair size in *Chauna*), the presence or absence of the femoro-caudal, the semitendinosus, and their accessory heads (which are all four found in *Chauna*). Having dwelt fully on the importance of these muscles in the paper just referred to, all I need remark on the present occasion with regard to them is, that there is therefore a difference between this bird and all the true anserine birds, in none of which is there ever a trace of the accessory semitendinosus. A reference to my paper on the muscles of the thigh of birds will show that in possessing all the five above-mentioned muscles the Screamers agree only with the Gallinæ and their nearest allies, the Rallidæ, Musophagidæ, Cuculidæ, Columbæ, and some of the Limicolæ.

With reference to secondary myological points, there are four which, in my estimation, deserve special attention. They are:—

1. The presence or absence of the *expansor secundariorum* muscle.
2. The presence or absence of a special muscular slip from the *biceps humeri* to the patagium.
3. The area of origin of the *obturator internus*.
4. The degree of development of the *tensor-cruris fasciæ*.

These will be considered separately.

1. *The presence or absence of the Expansor secundariorum muscle.*

Expansor secundariorum is the name which it is my habit to employ for a very small and peculiar triangular muscle arising from the quills of the last few (generally two or three) secondary remiges at the elbow. Its remarkably long and slender tendon, which frequently traverses a fibrous pulley on the axillary margin of the *teres* muscle, runs up the arm side by side with the axillary vessels and nerves to be inserted in the thorax, into the middle of a tendon which runs from the inner side of the middle of the scapular element of the scapulo-coracoid articulation to near the middle of the thoracic border of the sterno-coracoid articulation, at right angles to it when the fore limb is extended. This arrangement being found very well differentiated in the Storks, may, for the sake of convenience, be termed *Ciconine*. In *Chauna* it is exactly the same, as may be seen from the accompanying drawing (Plate XIV. fig. 1, *e.s*).

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* *Vide* P. Z. S. 1874, p. 116.

In the majority of the Gallinaceous birds the *expansor secundariorum*, with the normal origin from the secondary quills, has a different method of insertion, which has led M. A. Milne-Edwards to describe the muscle in the common Fowl as a part of the *coraco-brachialis* (*brevis*) in his superb work on fossil birds.

In the genera *Tetrao, Francolinus, Rollulus, Phasianus, Euplocamus, Gallus, Ceriornis*, and *Pavo*, the muscle instead of being inserted into the scapulo-sternal fibrous band above referred to, after blending to a certain extent with the axillary margin of the *teres*, ceases by becoming fixed to a fibrous intersection about one third down the *coraco-brachialis brevis* muscle.

In *Francolinus clappertoni* from among the Francolins, *Coturnix, Odontophorus, Ortyx, Eupsychortyx*, and *Numida*, the tendon does not go so far as the short *coraco-brachialis*, but ends either by simply joining the axillary margin of the *teres*, or by at the same time sending a tendinous slip behind it to the scapula. In *Argus giganteus* the tendon, running from the elbow, turns round the axillary border of the *teres* to end by joining a triangular muscular fasciculus, attached by its base to the upper portion of the thoracic surface, which appears to be nothing but a differentiation-off of the upper portion of the last-named muscle. In the *Cracidæ* this insertion into the scapula is also found, but it is tendinous, like the upper element of the thoracic band above described in the Storks and *Chauna*; and in them there is also a second tendinous slip from the axillary margin of the *coraco-brachialis longus* (Plate XII. fig. 5) (not the *brevis*). In the Megapodidæ also the attachment to the *coraco-brachialis brevis* is wanting, the tendon ending either by blending with the *teres*-margin, or running on to the scapula.

In the Ducks and Geese among the Anseres the tendons under consideration, when they enter the thorax, run towards one another and join, after having expanded out, in the middle line, in front of the œsophagus, and behind the trachea. In the Swans this arrangement is not found, the tendons ending in the ciconine manner, or by running to the upper end of the scapula; and in this respect *Sarcidiornis* resembles them.

From the tabular statement now exhibited (see p. 199) the nature as well as the presence or absence of this muscle can be determined in any special group of birds. The only Anomalognathous birds in which I have found this muscle are the Coraciidæ.

2. *The presence or absence of a special muscular slip from the Biceps humeri to the Patagium.*

The *biceps humeri*, the main flexor of the arm, arises from the upper end of the coracoid bone, and from the upper portion of the flexor surface of the humerus. In certain birds this muscle sends off from its upper end a slender fusiform belly, which runs through the proximal portion of the patagium to join its marginal tendon near the middle of its course (Plate XIV. fig. 2). The presence or absence of this muscular fasciculus is a very constant character among closely allied birds. In the Table (p. 199) are recorded the names of all those birds in which, according to my experience, it is to be found. The only Anomalogonatous birds in which I have seen it are the *Caprimulgidæ*.

3. *The Area of Origin of the Obturator internus.*

It is not my intention on the present occasion to enter into the consideration of whether the muscle here called *obturator internus* is homologous with the same-named muscle in Mammalia; suffice it to say that it arises from the pelvic surface of the pubis and ischium, and ends by a tendon which is inserted into the outer surface of the head of the femur.

In a large number of birds, on looking at the pelvic view of this muscle when undisturbed, its shape is seen to be an elongated oval, occupying the obturator fossa, and covering the line of junction of the ischium and pubis. In another large number of birds, instead of being oval it is triangular, its posterior fibres expanding in such a way as to cover most of the pelvic surface of the ischium. There are a few birds in which an intermediate condition is found; they are, however, very few. In most there is not the least difficulty in deciding whether the *obturator internus* is *oval* or *triangular* (compare Plate XV. figs. 1 and 2). From the Table (p. 199) the arrangement existing in most birds can be found.

4. *The degree of Development of the Tensor-cruris fasciæ.*

To this point I have referred in my paper on the muscles of Birds*, where its relations are explained. "It is the superficial muscle of the outside of the thigh, covering the femur. It is flat and triangular in shape, and arises as a membranous expansion which covers the gluteus ii., from the lower two thirds of the posterior border of the iliac fossa in which that muscle is situated, and from the fibrous septum which separates that muscle from the gluteus iii. Further down it has origin also from the whole length of the ridge which separates the postacetabular area from the external lateral surface of the ischium, and which may be termed the postacetabular ridge, as well as from the posterior border of the ischium, as far forwards as its junction with the pubis, being here slightly overlapped by the semitendinosus. The fibres converge towards the knee; and the deep portion of the muscle blends in its course with the vastus externus, together with which it continues forward to become part of the broad thin tendon which covers the knee and is inserted in the front of the tibia-head, the patella being situated in it, together with the long, slender, and flat tendon of the *ambiens* muscle, which is situated below it, running obliquely from inside and above, outwards and downwards. In many birds this muscle does not extend below the level of the femur, but ends inferiorly by blending with the vastus externus; and consequently, where such is the case, it evidently cannot, as it does otherwise, cover any of the flexors of the leg." Whether this postacetabular portion of the *tensor fasciæ* is present or absent can be found by referring to the Table (p. 199). There are not many birds in which it is very small.

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* P. Z. S. 1873, p. 628.

As the Anserine affinities of the Screamers are being discussed, it ought to be mentioned that in all the former the great pectoral flexor of the wing is peculiarly elongate, and extends upwards above the *symphysis furculæ*, with its fellow forming a median raphe as an anterior continuation of the *carina sterni*. The only other birds in which this occurs are the Penguins. In the Screamers the great pectoral flexor is not large, and does not extend upwards above the middle of the furcula.

In the Anseres the extensor pectoral (second pectoral) is always very long and broad, reaching the lower end of the sternum. In *Chauna* it does not extend nearly to the posterior margin of the sternum, and it is not bulky.

Again, the muscles of the Anseres are always intensely dark in colour, whilst in the Screamer they are quite pale. In this respect the two groups differ in the same way as do the Seals and the Sirenia among Mammals.

Osseous System.—The skull, being that portion of the skeleton which is least permeated with air, will receive the greatest attention on the present occasion. With reference to it Prof. Parker remarks*, "All the skull and face, except at its two ends, conforms to the lamellirostral type." Prof. Huxley also places *Palamedea* in his group "Chenomorphæ," among the several features characterizing those birds being that "the lachrymal region of the skull is remarkably long." That such is not the case in *Chauna*, Prof. Parker has remarked in his article "Birds" in the Encyclopædia Britannica†.

It may be well before proceeding further to inquire more fully into the nature of the lamellirostral type. Prof. Parker tells us that "the great embryological distinctions between the skull and face of the Geese and Fowls are, first, that in the latter the space between the periotic mass and the superoccipital cartilage is a mere chink, in the latter a persistent oval space; and secondly, that the anterior parts of the face, viz. the præmaxillæ, prævomers [maxillæ], and dentaries are small and compressed in the Fowls, large and outspread in the sifting birds." A glance at the accompanying figures of the posterior surface of the skulls of a Magellanic Goose, a Derbian Screamer, and a Razor-billed Curassow will enable the reader to decide for himself which of the two groups, the Anseres or the Gallinæ, the

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* P. Z. S. 1863, p. 514.

† Enc. Brit. 8th edit. vol. iii. p. 712.

Screamer more closely approaches. It evidently does not share the peculiarities of the former, in all species of which the surface of origin for the pair of large extensor muscles of the mandible is characteristically compressed from side to side, and elongated from above downwards, at the same time that there is the pair of openings above the foramen magnum (figs. 1, 2, 3, p. 198).

Again, from a comparison of the inferior surfaces of the same three skulls, it is equally evident that in the Screamer the præmaxillæ, maxillaries, and dentaries agree with the same bones in the Gallinaceous bird in not being large and outspreading. The palate of *Chauna* is represented in fig. 4.

In the Screamers the skull is, no doubt, as in the Anseres, desmognathous, having the maxillo-palatines united across the middle line; but this character is not sufficiently important to compel us to unite the two groups; for if such were the case it would be necessary to give credence to an association of birds which is in other respects extremely unnatural. In the Capitonidæ, for instance, *Megalæma* is not desmognathous, whilst *Tetragonops* is so.

As before stated, in the Anserine birds the lachrymal region is specially long. This is least marked in the *Cereopsis* Goose (*Cereopsis novæ-hollandiæ*), where, however, it is clearly apparent. In *Chauna*, the lachrymal region is as short as in the Gallinæ, not in the least elongated.

In both the Anseres and Gallinæ the pterygoid bones have large faceted surfaces for articulation with the basisphenoid rostrum. In both groups these facets are situated very far forwards—quite at the anterior ends of the bones in the latter; in *Chauna*, however, these articulations are quite independent of the anterior ends of the bones (fig. 4), being nearly as far backward as the middle of their otherwise free moieties.

As to the quadrate bones, their cranial articulations are bifid, which is the case in all birds except *Struthio*, *Rhea*, *Dromæus*, *Casuarius*, *Apteryx*, the Crypturi, and *some* (most) of the Gallinæ. They do to a certain extent resemble the same bones in the Anseres in having the articular surfaces for the jugal arches situated some way behind the level of their mandibular articulations (not a Gallinaceous character), which latter they also resemble in configuration, the usually extended outer facet not running backwards and inwards as in most birds but not in the Gallinæ.

In the Gallinæ, as in the Crypturi, the pterygo-quadrate articulation is much longer than in other members of the class. In *Chauna* this is not the case.

In *Chauna* the angle of the mandible is much prolonged and upcurved, as in the Anseres, from which it however differs in not being deeply excavated in the interval between the upturned process and the inwardly-directed articular angle. It must be remembered that the mandible is much the same in the Gallinæ.

It must also be remembered that the Screamers are the only birds in which there are no uncinate processes to the ribs, as has been shown by Mr. Parker.

Fig. 1.

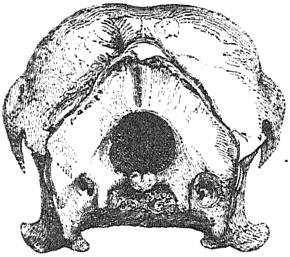


Fig. 3.

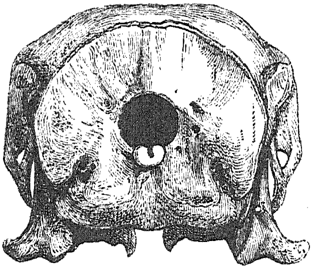


Fig. 2.

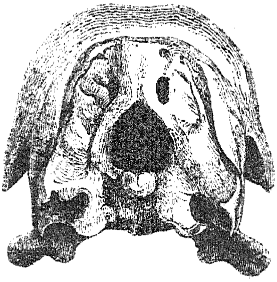


Fig. 4.

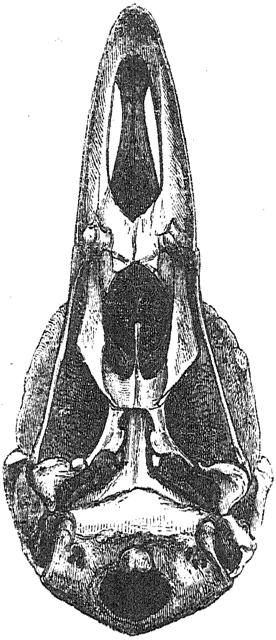


Fig. 1. *Chauna derbiana.* Back view of skull.
Fig. 2. *Chloëphaga magellanica.* Back view of skull.
Fig. 3. *Mitua tuberosa.* Back view of skull.
Fig. 4. *Chauna derbiana.* Base of skull.

TABLE.

Name of family.	Expansor secundariorum (see p. 193).	Biceps slip to the patagium (see p. 195).	Obturator internus (see p. 195).	Postacetabular portion of tensor fasciæ (see p. 195).
TINAMIDÆ	Ciconine.	Absent.	Triangular.	Large.
PALAMEDEIDÆ	Ciconine.	Absent.	Oval.	Absent.
GALLINÆ	Present (vide p. 194).	Absent only in Cracidæ.	Triangular.	Large.
RALLIDÆ	Ciconine.	Present.	Triangular.	Large.
OTIDIDÆ	Ciconine.	Absent.	Oval.	Present.
Cariama	Ciconine.	Absent.	Triangular.	Present.
Phœnicopterus	Ciconine.	Present.	Oval.	Present.
Serpentarius	Ciconine.	Absent.	Triangular.	Absent.
MUSOPHAGIDÆ	Ciconine.	Absent.	Triangular.	Present.
CUCULIDÆ	Ciconine.	Absent.	Triangular.	Present.
PSITTACI	Absent.	Absent.	....	Absent.
ANATIDÆ	Ciconine in Cygninæ, peculiar in others (vide p. 194).	Present.	Peculiar from elongation of pelvis.	Present, except in Cygninæ.
SPHENISCIDÆ	....	....	Triangular.	Absent.
COLYMBIDÆ	Not seen.	Present.	?	Present.
PODICIPITIDÆ	Not seen.	Present.	Oval.	Present.
PROCELLARIIDÆ	?	?	?	?
FULMARIDÆ	?	?	Oval.	Absent.
PELARGI	Ciconine.	Absent.	Oval.	Absent, or extremely small.
CATHARTIDÆ	Ciconine.	Absent.	Triangular.	Present.
HERODIONES	Ciconine (not in *Cancroma* and *Egretta*).	Absent.	Triangular.	Absent, or extremely small.
STEGANOPODES	Absent.	Absent, except in *Phalacrocoracidæ*.	Oval.	Absent.
ACCIPITRES	Absent (not in *Falco*, *Polyborus*, and *Tinnunculus*).	Absent.	Triangular (exc. *Neophron*).	Absent.
STRIGIDÆ	Absent.	Absent.	Triangular (not *Scops*).	Absent.
COLUMBÆ	Feeble or absent.	Present.	Oval.	Present.
CHARADRIIDÆ	Ciconine.	Present.	Oval.	Present.
GRUIDÆ	Ciconine.	Present.	Triangular.	Present.
LARIDÆ	In some.	Present.	Oval.	Absent.
ALCIDÆ	Absent.	Present.	Oval.	Present (not in *Arctica alle*?).

In conclusion, it seems to me that from considerations of pterylosis, visceral anatomy, myology, and osteology, the Screamers cannot be placed along with the Anserine birds. In the windpipe and the form of the angle of the jaw they, no doubt, closely approach them. In their alimentary canal they are much nearer to *Struthio* and *Rhea* (not *Dromæus* and *Casuarius*) than to any other birds. There is a Ciconine tendency in their myology, whilst their osteology points in no special direction. It seems, therefore, to me that, summing these results, the Screamers must have sprung from the primary avian stock as an independent offshoot at much the same time as did most of the other important families. It may be fairly asked what reason there is for the assumption that there was a sudden break up of the bird-type at any particular period. It appears to me from the study of anatomy that this was the case; and it is evident that the acquisition of wings by the previously terrestrial type form must have suddenly interpolated a large number of intruders into domains already occupied, and must have all at once called forth a new aerial struggle for existence, which, from the generalness of its action must, within a short time, have brought out a great number of special characters by natural selection.

EXPLANATION OF THE PLATES.

Plate XII.

Fig. 1. Proventriculus and gizzard of *Chauna derbiana*, cut open, and part of the front wall removed.
2. Anterior view of lower portion of windpipe of *C. derbiana*.
3. Back view of same, the muscles of the left side having been removed.
4. Right side view of same.
5. Portion of right coracoid bone (*c*) with *coraco-brachialis longus* (*c.b.l*) and *coraco-brachialis brevis* (*c.b.b.*) *in situ*, of *Crax globicera*. The *expansor secundariorum* (*e.s*) is seen to spring partly from the first-named muscle.

Plate XIII.

Fig. 1. Cæca of *Chauna derbiana*, with the anterior wall partly removed to show the cavity intervening between the small and large intestine into which the cæca open.
2. The cæca, external view.

Plate XIV.

Fig. 1. Axillary muscles of right side of *Chauna derbiana*. *e.s*, expansor secundariorum; *p* 1, great pectoral; *p* 2, second pectoral; *c.b.l*, coraco-brachialis longus; *b*, biceps; *t*, triceps; *t.p.b*, tensor patagii brevis; *sc*, scapula; *st*, sternum; *c*, coracoid; *f*, furcula; *h*, humerus; *c.v*, cervical vertebræ; *tr*, trachea: *S.R*, secondary remiges.
2. The same part, left side, of *Gallinula chloropus*. *B. slip*, biceps slip; *t.p.l*, tensor patagii longus.

Plate XV.

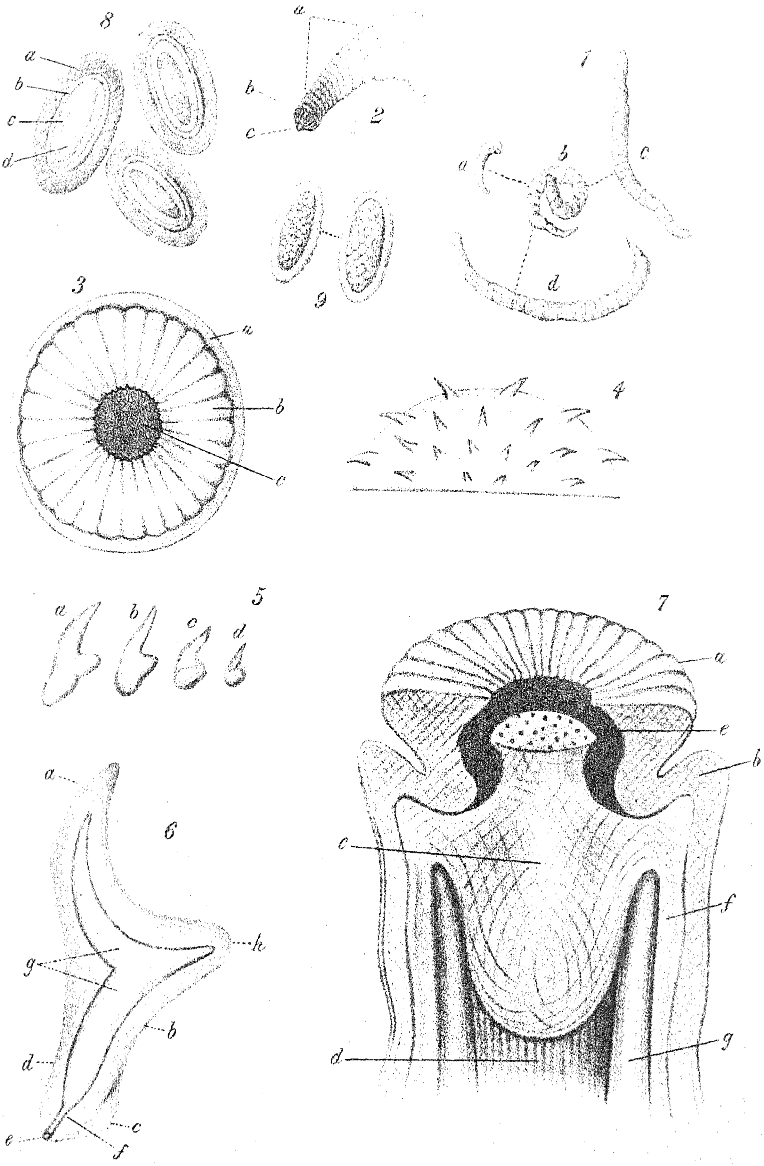
Fig. 1. Muscles of right side of interior of pelvis and inner side of thigh of *Chauna derbiana*, the muscles of the anterior abdominal wall having been removed. *o.i*, obturator internus; *Amb*, Ambiens; *Quad*, Quadriceps extensor; *Ad*, adductor; *s.t*, semitendinosus.
2. The same parts of *Euplocamus albocristatus*, similarly lettered. *sart*, sartorius.

4. Notes on Entozoa. Part III. By T. Spencer Cobbold, M.D., F.R.S., F.L.S., Correspondent of the Academy of Sciences of Philadelphia.

[Received January 18, 1876.]

(Plate XVI.)

In continuing the "Notes" commenced in 1873, I may observe that I have recently received important additions from naturalists



T.S.C. del. J. Smit lith.

M & N. Hanhart imp.

ECHINORHYNCHUS ELEGANS.

abroad. Although it so happens that comparatively few of the parasites are altogether new to science, yet most of the contributions present, in one way or another, points of interest. I propose in future to extend the character of my notes, not only recording new habitats and describing new species, but also paying regard to all facts tending to throw light upon the question of geographical distribution. I wish also to remark more fully on structural and morphological peculiarities, especially when dealing with aberrant types. The importance of certain species in relation to epidemics will also receive attention. None can regret more than myself the necessarily incomplete character of these records. It is evident, however, that if we home-naturalists defer all public notice of the receipt of specimens from co-workers abroad until we happen to have time at our command to do full justice to the contributions, a multitude of useful facts will inevitably be lost to science. In this connexion I may likewise observe that the mere verification of already known phenomena, especially in the matter of distribution, is not without its cumulative value.

8. FILARIA TEREBRA (Diesing).

On the 27th of February, 1875, Dr. Edward L. Moss, of H.M.S. 'Alert,' now engaged in the Arctic Expedition, brought me three examples of a nematode, which I have little hesitation in referring to this species.

Dr. Moss obtained these parasites in 1874, during the time that he had charge of the Naval Hospital at Esquimalt, Vancouver's Island, British Columbia. They occupied the abdominal cavity of the Black-tailed Deer (*Cervus columbianus*). The worms (usually one, but occasionally two, being present in each cervine bearer) were commonly found lying amongst the coils of the small intestine. They had not in any way attached themselves to the peritoneal membrane. I understood Dr. Moss to say, in conversation, that he had shot seventeen deer in all, the males and females being in about equal proportion; nevertheless not one of the bucks examined by him showed any trace of the presence of these entozoa. This absence of parasites in the male hosts can hardly, I should think, have been otherwise than accidental. Hitherto the worm appears to have been observed in the Red Deer (*C. elaphus*) and in three species of American Roe (*C. rufus*, *C. simplicicornis*, and *C. nambi*) by Natterer. Two of the worms measured each about 2½ inches in length, the third exceeding 3 inches. The head of one was injured; but the other two displayed in profile two prominent oral papillæ. Probably there were four of these processes, such as Dujardin described in his *Filaria cervina*, which, according to Diesing, is a synonym of this species. The body is marked throughout its entire length by a series of prominent and regular folds, these, in some situations, becoming so conspicuous that, under an ordinary pocket-lens, they present a beaded appearance. All the specimens had their attenuated tails more or less spirally twisted; and a single brown-coloured line occupied the whole length of the body. The precise relations of this narrow but well-marked band are worthy of further study. I believe the parasites were all males; but I was unable to detect the external sexual openings.

9. ECHINORHYNCHUS TRANSVERSUS (Rud.)

On the 18th of Febuary, 1875, I received from Dr. Hooker, Pres. R.S., eleven examples of a small acanthocephalus worm for identification. They were obtained by his son, Mr. Charles P. Hooker, who subsequently informed me by letter that he had found them in a Redwing (*Turdus iliacus*) which he dissected on or about the 5th of January, 1875. It was also mentioned that the worms occupied the large intestine, probably to the number of one hundred in all. Hitherto this parasite has been found abundantly in the Blackbird, Thrush, and in most of the *Turdidæ*; but not, I believe, in the Redwing. It has also been obtained from the Starling and Redbreast.

The occurrence of so many of these armed parasites in one host is a noteworthy circumstance; and it is difficult to understand how they could be present in such numbers without inflicting severe injury on the bearer. Of course there is no proof that the bird did not suffer inconvenience: at all events, analogous facts of parasitism produced by other species of Echinorhynchi show that these Entozoa are occasionally productive of fatal results.

10. ECHINORHYNCHUS ECHINODISCUS (Diesing).

On the 1st of November, 1875, I received from Prof. Flower, F.R.S., a glass jar labelled as follows, "Entozoon found attached to intestine of the Tamandua Ant-eater." The parasite was obtained from the Society's Gardens on the 12th of August, 1871.

The Brazilian traveller, Natterer, originally obtained this worm from *Myrmceophaga jubata* and *M. bivittata*. Creplin described it from a *M. didactyla* from Surinam (Wiegmann's Archiv, 1849). I presume the *M. tamandua* answers to the *M. bivittata* of Geoffroy, as well as to the tridactyle and tetradactyle species of Linnæus.

The parasite in question appears to have been solitary. It is a female, measuring exactly 10 inches long. The annulations of the body commence about ½ an inch from the head, and are continued on uninterruptedly with great regularity to the end of the tail. On the average, twenty rings may be counted to the inch; thus there are quite 200 altogether, as they are somewhat more closely packed towards the neck and also at the tail. The proboscis was firmly anchored within the gut; and I was unsuccessful in my attempt to dissect it out entire. For a space of ¼ of an inch in diameter at the point of anchorage, the intestine was opaque from inflammatory exudation.

11. ECHINORHYNCHUS ELEGANS (Diesing).

Six or eight years back, Dr. Murie placed in my hands a glass jar containing eight parasites. I could not examine them at the time; but on the 18th of April 1873 I made a careful study of the worms, briefly noting down the principal facts of structure. Although the label on the jar was in places well nigh obliterated, I made out that the worms had come from a Monkey; but not being certain as to the species, I did not attempt the identification of the parasites. Dr. Murie has since further obliged me by looking up his notes; and on the 2nd of April 1875, he informed me by letter that the host was a Pinche Monkey (*Hapale œdipus*). This well known Marmoset had been obtained from New Granada. The cause of the animal's death, which occurred at the Society's Gardens on or about the 30th of June, 1866, was not ascertained. I have not in this case observed any signs of inflammation in the intestine of the host, a portion of which, with several of the Entozoa remaining attached was also supplied to me. The mucous layer of the gut shows deep conical depressions at the spots where the detached worms had anchored themselves.

So far as I can make out, Diesing's original description of the parasite is the only one that exists. I have gone over his numerous memoirs contributed to the Vienna Accademy, but can find nothing beyond the specific characters given in his 'Systema.' All the specimens in the Vienna Museum, whence his description is taken, were collected by Natterer. They were procured from the Marakina (*Midas rosalia*), from two other true Marmosets (*Hapale ursulus* and *H. chrysoleucus*), and from a Squirrel Monkey or Tee-tee (*Callithrix sciureus*).

Though in one or two unimportant particulars our observations do not agree, Diesing's description is amply sufficient for the systematist's purpose. By referring to the four specimens which I have selected for illustration, it will be seen that all the worms were more or less bent upon themselves. The larger specimens present a tolerably uniform thickness throughout, the smaller ones being thicker behind and almost club-shaped (Plate XVI. fig. 1). In detached examples, the front end of the parasite is seen to support a narrow and long neck, which is usually well marked off from the body proper (*d*). It is more or less regularly annulated, the folds being continued downwards along the body, but gradually losing their regular arrangement. If the anterior extremity of the neck be examined with a powerful pocket lens, its abrupt and truncate surface will be seen to display a number of lines or grooves radiating from a common centre (fig. 2). During the perfect retraction of the proboscis the centre is represented by a clear space, or wide opening, which communicates with a cavity immediately beneath. The end of the neck thus forms a sort of collar, or rosette, made up of rays arranged like the spokes of a wheel. When the proboscis is exserted this collar is more or less convex, but it becomes slightly concave when the proboscis is retracted. Not improbably this attractive-looking surface suggested to Diesing the specific title which he gave to the worm. He recognized 24 rays: they probably vary from that number up to 28; at least, I counted 27 in the specimen (fig. 3). During exsertion, the proboscis forms, to the naked eye, a nipple-like projection (fig. 2). According to Diesing it supports three rows of hooks; but I certainly saw four rows (fig. 4). When separately magnified these hooks present very different appearances as to size and contour. These I believe to be due to respective degrees of growth (fig. 5). Selecting one of the largest hooks, I found it to measure about $\frac{1}{200}$ in. in length, the broadest part of its posterior root-process giving $\frac{1}{1000}$ in. approximately. The base between the two fang-points measured $\frac{1}{250}$ in.; whilst internally the hook displayed a well-defined cavity taking the general form of the organ itself. At its lowermost angle the cavity becomes suddenly narrowed into a fine channel that terminates in an opening at the centre of the extremity of the posterior fang. This tube is something less than the $\frac{1}{10000}$ inch in diameter (fig. 6).

By making a vertical section of the worm one may obtain a good veiw of the arrangement of the parts about the head. Somewhat diagrammatically I have represented the parts as they appear in the retracted condition of the proboscis (fig. 7). This organ is now seen resting, as it were, in a cavity formed by the arching over of the rosette-shaped collar. The sheath of the proboscis itself is bordered by powerful retractor muscles, which during extreme contraction reduce the proboscis to the form of an oval disk, at the same time carrying the whole organ downward so as to conceal it entirely within the lumen of the neck. The lower end of the muscular sheath assumes the shape of a reversed cone, well rounded off at its dependent apex. The sides of the neck are lined with longitudinal muscular bundles, portions of which are, I suspect, differentiated to form the special retractors of the sheath. Be that as it may, on either side of the bulbous end of the sheath the lemnisci are conspicuous and easily drawn out with a fine pair of forceps. They extend downwards to near the centre of the somatic cavity, attaining, in the largest specimens, a length of no less than $\frac{3}{4}$ inch. Free ovaria were not observed; but I found abundance of eggs, which were of an oval form, measuring about $\frac{1}{500}$ in. from pole to pole and $\frac{1}{800}$ in. in breadth. They displayed three distinct envelopes. The outer transparent and very delicate membrane was marked by decussating curvilinear lines (fig. 8 *a*), being succeeded by a second thicker envelope (*b*), the two being separated by fluid contents. Many ova were found freed from these coverings, these being, as a rule, rather more advanced in growth, as shown by their finely divided yolk-contents, which in some instances had passed into an early embryonal stage. In this condition the eggs measured only $\frac{1}{750}$ by $\frac{1}{670}$ in. My sections of the body of the parasite showed the openings of numerous water-vascular channels; but I did not carry the investigation further.

EXPLANATION OF PLATE XVI.

Fig. 1. Four examples of *Echinorhynchus elegans*: *a*, immature; *b*, *c*, *d*, full-grown, natural size.

Fig. 2. Anterior extremity of a mature worm, showing the annulations of the neck (*a*), the collar in profile (*b*), and the exserted portion of the proboscis (*c*). Enlarged.

Fig. 3. The collar, viewed from above, showing the folded border of the neck (*a*), the series of rays (*b*), and the central opening (*c*). Highly magnified.

Fig. 4. Diagram of the proboscis in its retracted condition, to show the arrangement of the hooks.

Fig. 5. Four of the hooks as serially arranged on the proboscis: *a*, from the external series, *b*, from the second, *c*, from the third, and *d*, from the innermost, respectively. Magnified 60 diameters.

Fig. 6. A hook from the outermost row; showing the apex (*a*), base (*b*), bulbous projection (*c*), the posterior root-process or fang (*d*), the minute opening at its extremity (*e*), which by means of a narrow channel (*f*) communicates with the general cavity of the organ (*g*). The anterior fang is marked *h*. Magnified 355 diameters.

Fig. 7. Diagram representing a vertical section of the anterior end of the neck: *a*, collar; *b*, fold of the first annulation; *c*, sheath of the proboscis; *d*, lumen of the neck; *e*, cavity for lodgment of the retracted proboscis; *f*, longitudinal muscular layer; *g*, lemniscus.

Fig. 8. Three eggs, showing the outer (*a*), middle (*b*), and inner envelope (*c*); also the yolk (*d*). Magnified 350 diameters.

Fig. 9. Two of the eggs found divested of their external coverings.

5. List of the Butterflies of Peru, with Descriptions of new Species. By HERBERT DRUCE, F.L.S., F.Z.S. With some Notes by EDWARD BARTLETT.

[Received January 10, 1876.]

(Plates XVII. & XVIII.)

During the past few years Mr. Salvin and I have received several collections from Peru, principally made by Mr. Henry Whitely. I now think it advisable to draw up the following list of the species, only including those that I have been able to examine myself, and of which I am certain of the locality being correct. I hope by so doing to give some idea of the Butterfly-fauna of Peru, as well as to advance our knowledge of the geographical distribution of Butterflies. The collections from which I have made this list were formed by Mr. Bartlett, Mr. Henry Whitely, and Mr. Pearce, in the following localities.

Mr. Bartlett collected in the eastern part of Peru; for the exact places visited by him, see map, P. Z. S. 1873, p. 252, pl. xxv. Mr. Henry Whitely's principal collection was made in the valley of Cosnipata, situated on the eastern slope of the Andes of Caravaya, and the smaller collections at Paucartombo and Huasampilla, eastward of Cuzco, at an elevation of about 9000 to 10,000 feet; he also made a very small collection last year at Huiro, valley of Santana, north of Cuzco, at an elevation of about 4800 feet. Mr. Pearce, who travelled in Peru and Bolivia as a botanical collector for Messrs. James Veitch and Sons, the well-known Horticulturists, collected at Pozzuzo and Mŭna.

The collections contained 494 species (18 of which I have described as new), representing 133 genera.

Mr. Bartlett's collection had been picked over before any specimens came into our possession; so that this list does not contain all the species collected by him.

Family I. NYMPHALIDÆ, Swains.

Subfamily 1. DANAINÆ, Bates.

Genus DANAIS, Latr.

1. D. ERESIMUS, Cram. (*Pap. e.*) Pap. Exot. ii. t. 175. f. G, H (1779).

Ucayali (*Bartlett*). Mus. D.
"Not common; frequents the banks of rivers."—*E. B.*

2. D. HERMIPPUS, Feld. Reise Nov. Lep. ii. p. 348 (1867).

Cormillo (*Pearce*). Mus. S. G.

Genus LYCOREA, Doubl.

1. L. CLEOBÆA, Godt. (*Helic. c.*) Enc. Méth. ix. p. 222 (1819).

Peru. Mus. D.

2. L. ATERGATIS, Doubl. & Hew. Gen. D. L. t. 16. f. 1 (1847).

Pozzuzo (*Pearce*). Mus. S. G.
Nauta (*Bartlett*). Mus. D.
"Found in damp shady places."—*E. B.*

Genus ITUNA, Doubl.

1. T. PHENARETE, Doubl. & Hew. Gen. D. L. t. 17. f. 1 (1847).

Pozzuzo (*Pearce*). Mus. S. G. & D.

Genus METHONA, Doubl.

1. M. PSIDI, Linn. (*Pap. p.*) Mus. Ulr. p. 228 (1764).

Pozzuzo (*Pearce*). Mus. S. G.
Ucayali (*Bartlett*). Mus. D.
"In shady places on the banks of the Ucayali."—*E. B.*

Genus THYRIDIA, Hübn.

1. T. INO, Feld. Wien. ent. Mon. vi. p. 75 (1862).

Pozzuzo (*Pearce*). Mus. S. G.

Genus DIRCENNA, Doubl.

1. D. ZELIE (*Helic. z.*), Guér. Icon. Règne Anim. Ins. texte, p. 470 (1844).

Ucayali (*Bartlett*). Mus. S. G. & D.
"Frequents dull shady places."—*E. B.*

2. D. RHŒA, Feld. Wien. ent. Mon. iv. p. 102 (1860).

Ucayali (*Bartlett*). Mus. S. G.

Genus CERATINIA, Hübn.

1. C. OULITA, Hew. (*Ith. o.*) Exot. Butt. ii. *Ith.* t. 22. f. 138 (1859).

Peru. Mus. D.

2. C. STATILLA, Hew. (*Ith. s.*) Exot. Butt. v. *Ith.* t. 32. f. 217 (1874).

Huiro, valley of Santana (*H. Whitely*). Mus. D.

3. C. CRISPINILLA, Hopff. Stett. ent. Zeit. 1874, p. 340.

Ucayali (*Bartlett*). Mus. D.

4. C. SEMIFULVA, Salv. Ann. Nat. Hist. ser. 4, vol. iv. p. 163 (1869).

Pozzuzo (*Pearce*). Mus. S. G. & D.

5. C. ANASTASIA, Bates, Trans. Linn. Soc. xxiii. p. 526 (1862).

Ucayali (*Bartlett*). Mus. D.

"Taken in the broad pathways to Sarayacu on the Upper Ucayali; not common."—*E. B.*

6. C. FRATER, Salv. (*Ith. f.*) Ann. Nat. Hist. ser. 4, vol. iv. p. 163 (1869).

Pozzuzo (*Pearce*). Mus. S. G. & D.

7. C. ALEXIA, n. sp. (Plate XVII. fig. 4.)

Upperside (*female*): anterior wing black, with the base rufous orange; a yellow spot at the end of the cell and one below nearest the anal angle crossed near the apex by a band of yellow, a submarginal row of six small white spots; posterior wing rufous orange, a spot at the end of the cell and the outer margin black. Underside the same as above, with less orange-colour; the costal margin of the posterior wing black, and a submarginal row of white spots on the hind margin.

Exp. 2¼ inches.

Peru. Mus. D.

8. C. BAANA, n. sp.

Upperside (*female*) orange; anterior wing crossed beyond the middle by a narrow band of yellow, an elongated spot in the cell, one at the end of the cell, and one below near the inner margin all black; the apex broadly black; posterior wing orange, with the outer margin (which is very narrow) black. Underside the same as above, except that the base of the posterior wing is yellow, the costal margin black, and a submarginal band of white spots to both wings.

Exp. 2¼ inches.

Peru. Mus. D.

9. C. TIGRINA, n. sp. (Plate XVII. fig. 2.)

Upperside (*female*) like *C. fluonia* without the yellow markings, except a small spot beyond the middle on the costal margin, the apex rufous with a marginal row of black spots; posterior wing rufous, with the central band as in *C. fluonia*, the outer margin black, dentated on the inner side. Underside as above.

Exp. 2¼ inches.

Ucayali (*Bartlett*). Mus. D. & S. G.

The specimens vary in the amount of yellow in the posterior wing. It may be a local race of *C. fluonia*, but is a distinct and well-marked form.

Genus Sais, Hübn.

1. S. zitella, Hew. (*Ith. z.*) Exot. Butt. iv. *Ith.* t. 25. f. 176 (1868).

Ucayali (*Bartlett*). Mus. S. G. & D.

Genus Scada, Kirby.

1. S. theaphia (Bates), Trans. Linn. Soc. xxiii. p. 529 (1862).

Ucayali (*Bartlett*). Mus. D.

"Found in low moist places in the forest, upon a small white flower."—*E. B.*

Genus Mechanitis, Fabr.

1. M. ortygia, n. sp. (Plate XVII. fig. 5.)

Upperside (*male*) transparent yellowish white, bordered with greyish black, the margins all black; the anterior wing crossed at the end of the cell by a black band widest on the costal margin. Underside as above, except that the base and half of the costal margin of the posterior wing is yellow, and several white spots at the apex of both wings.

Exp. 2 inches.

Huiro, valley of Santana (*H. Whitely*). Mus. D.

A most singular species, exactly like an *Ithomia* with the neuration of *Mechanitis*.

2. M. polymnia, Linn. (*Pap. p.*) Mus. Ulr. p. 224 (1764).

Nauta and Chyavetes (*Bartlett*). Mus. D.

3. M. methone, Hew. Exot. Butt. ii. *Mech.* t. 3. f. 14 (1860).

Peru. Mus. D.

4. M. mazæus, Hew. *l. c.* t. 2. f. 8 (1860).

Huallaga (*Bartlett*). Mus. S. G.

5. M. ocona, n. sp.

Upperside (*male*): anterior wing black, the base to the middle of the cell rufous; an oblique band crossing the end of the cell to the apex and two others beyond bright yellow, the third close to the apex and only extending to the middle of the wing, four small white spots on the hind margin; posterior wing orange, yellowish in the middle, crossed from the inner margin to the apex by a zigzag band of black, the outer margin black, widest at the apex. Underside the same as above, with a submarginal row of white spots to both wings and the costal margin of the posterior wing black.

Exp. 2½ inches.

Huiro, valley of Santana (*H. Whitely*). Mus. D.

Mr. Whitely has only sent one specimen of this species.

Genus NAPEOGENES, Bates.

1. N. CORENA, Hew. (*Ith. c.*) Exot. Butt. ii. *Ith.* t. 23. f. 142 (1861).

Yurimaguas (*Bartlett*). Mus. D.
"Rare."—*E. B.*

2. N. VERTICILLA, Hew. Exot. Butt. v. *Ith.* t. 33. f. 219 (1874).

Peru. Mus. D.

3. N. PHARO, Feld. Wien. ent. Mon. vii. p. 76 (1862).

Ucayali (*Bartlett*). Mus. D.
"The species of this genus are found in the darkest parts of the forest, upon small obscure flowers, which they resemble, only being noticed when disturbed."—*E. B.*

4. N. PYRRHO, n. sp. (Plate XVII. fig. 1.)

Upperside (*female*): anterior wing orange, the apical half and a round spot in the cell black, crossed at the apex by a band of pale yellow; posterior wing orange, with the outer margin and a band of spots placed longitudinally across the middle black. Underside: anterior wing the same as above, with a submarginal row of white spots; posterior wing as above, with two small white spots at the apex.

Exp. 2¼ inch.
Yurimaguas (*Bartlett*). Mus. D.

Genus ITHOMIA, Hübn.

1. I. ANCHIALIA, Hew. Exot. Butt. iv. *Ith.* t. 26. f. 162 (1868).

Ucayali (*Bartlett*). Mus. D.

2. I. ILEDINA, Hew. C. C. ii. *Ith.* t. 21. f. 129 (1858).

Ucayali (*Bartlett*). Mus. D.
"Rare."—*E. B.*

3. I. JANARILLA, Hew. Exot. Butt. iii. *Ith.* t. 24. f. 150 (1863).

Yurimaguas (*Bartlett*). Mus. D.
"Very common."—*E. B.*

4. I. ONEGA, Hew. Exot. Butt. i. *Ith.* t. 1. f. 1 (1852).

Ucayali (*Bartlett*). Mus. D. & S. G.
"Very plentiful."—*E. B.*

5. I. ATTALIA, Hew. Exot. Butt. ii. *Ith.* t. 13. f. 77 (1855).

Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

6. I. QUINTINA, Feld. Reise Nov. Lep. ii. t. 44. f. 11, 12, iii. p. 361 (1867).

Chanchamayo (*Thamm.*). Mus. D.
Pozzuzo (*Pearce*). Mus. S. G.

7. I. TUTIA, Hew. Exot. Butt. i. *Ith.* t. 1. f. 6 (1852).

Nauta (*Bartlett*). Mus. D.

The specimen from Nauta differs from the type by having the yellow band replaced by tawny, and may prove to be a distinct species.

8. I. PHONO, Hübn. (*Hymenitis p.*) Zutr. ex. Schmett. f. 987, 988 (1837).

Yurimaguas (*Bartlett*). Mus. D.

9. I. ZAVALETTA, Hew. Exot. Butt. i. t. 9. f. 49 (1854).

Pozzuzo (*Pearce*). Mus. S. G.
Ucayali (*Bartlett*). Mus. D.
"Not common."—*E. B.*

10. I. SAO, Hübn. (*Hymn. s.*) Zutr. ex. Schmett. f. 767, 768 (1832).

Ucayali (*Bartlett*). Mus. D.
"Plentiful, and found flying with other species."—*E. B.*

11. I. ANTISAO, Bates, Trans. Linn. Soc. xxiii. p. 544 (1862).

Ucayali (*Bartlett*). Mus. S. G.

12. I. PRIMULA, Bates, Trans. Linn. Soc. xxiii. p. 545 (1862).

Yurimaguas (*Bartlett*). Mus. D.
"The only locality in which I found this species."—*E. B.*

13. I. EURIMEDIA, Cram. (*Pap. e.*) Pap. Ex. ii. t. 126. f. C, D (1779).

Nauta and Yurimaguas (*Bartlett*). Mus. D.
"Not common."—*E. B.*

14. I. ELARU, Hew. Exot. Butt. i. *Ith.* t. 11. f. 62, 63 (1855).

Ucayali (*Bartlett*). Mus. S. G.

15. I. SEBA, Hew. Exot. Butt. v. *Ith.* t. 20. f. 196 (1872).

Yurimaguas (*Bartlett*). Mus. D.

16. I. SALONINA, Hew. Exot. Butt. i. *Ith.* t. 14. f. 86 (1855).

Peru. Mus. D.

17. I. TIMNA, Hew. Exot. Butt. i. *Ith.* t. 8. f. 44 (1854).

Huallaga (*Bartlett*). Mus. S. G.

18. I. CHRYSODONIA, Bates, Trans. Linn. Soc. xxiii. p. 546, t. 56. f. 3 *a* (1862).

Yurimaguas (*Bartlett*). Mus. D.

19. I. CIDONIA, Hew. Exot. ii. *Ith.* t. 20. f. 121 (1857).

Yurimaguas and Huallaga (*Bartlett*). Mus. D. & S. G.

20. I. ORIANA, Hew. Exot. Butt. ii. *Ith.* t. 22. f. 134 (1859).
Ucayali and Yurimaguas (*Bartlett*). Mus. S. G. & D.
"Scarce."—*E. B.*

21. I. NEPHELE, Bates, Trans. Linn. Soc. xxiii. p. 548 (1862).
Huallaga (*Bartlett*). Mus. S. G.
Nauta and Yurimaguas (*Bartlett*). Mus. D.
"Not common."—*E. B.*

22. I. THEUDELINDA, Hew. Exot. Butt. ii. *Ith.* t. 23. f. 146 (1861).
Peru. Mus. D.

23. I. ZALMUNNA, Hew. Exot. Butt. iv. *Ith.* t. 27. f. 175, 176 (1869).
Peru. Mus. D.

Genus MELINÆA, Hübn.

1. M. CYDIPPE, Salv. Ann. Nat. Hist. ser. 4, vii. p. 412 (1871).
Pozzuzo (*Pearce*). Mus. S. G. & D.

2. M. ORESTES, Salv. C. C. p. 412.
Pozzuzo (*Pearce*). Mus. S. G.

3. M. PHASIANA, Butl. Trans. Ent. Soc. 1870, p. 489.
Yurimaguas (*Bartlett*). Mus. D.

4. M. CHINCHA, n. sp. (Plate XVII. fig. 3.)

♂. Exactly like *M. ishka*, Butl. (Hew. Exot. Butt. i. *Mech.* t. 1. f. 3), excepting that the yellow band is replaced by tawny.
Exp. 3¼ inches.
Pozzuzo (*Pearce*). Mus. S. G.

5. M. PARDALIS, Bates, Trans. Linn. Soc. xxiii. p. 552 (1867).
E. Peru (*Bartlett*). Mus. D.

Genus TITHOREA, Doubl.

1. T. HARMONIA, Cram. (*Pap. h.*) Pap. Exot. ii. t. 190 (1779).
Nauta (*Bartlett*). Mus. D.

2. T. NEITHA, Hopff. Stett. ent. Zeit. 1874, p. 337.
Chanchamayo (*Thamm.*). Mus. D.

Subfamily 2. SATYRINÆ, Bates.

Genus CITHÆRIS, Hübn.

1. C. AURORA, Feld. Wien. ent. Mon. vi. p. 175 (1862).
Ucayali (*Bartlett*). Mus. D.
Pozzuzo (*Pearce*). Mus. S. G.
"Found in the darkest parts of the forest, on the ground and about rotten fruit" &c.—*E. B.*

2. C. PYROPINA, Salv. & Godm. (*Callitæra p.*) Ann. Nat. Hist. ser. 4, ii. f. 141 (1868).

Pozzuzo (*Pearce*). Mus. S. G. & D.

Genus HETÆRA, Fab.

1. H. PIERA, Linn. (*Pap. p.*) Mus. Ulr. p. 220 (1764).

Ucayali and Yurimaguas (*Bartlett*). Mus. D.

"This species I found commonly in the dense and moist parts of the forest on the Upper Ucayali, and in similar localities at Yurimaguas, but not so plentiful."—*E. B.*

2. H. HYPÆSIA, Hew. Trans. Ent. Soc. ser. 2, ii. p. 247, t. 23. f. 2 (1854).

Valley of Cosnipata (*H. Whitely*). Mus. D.

3. H. MACLEANNANIA, Bates, Ent. Month. Mag. i. p. 180 (1865).

Pozzuzo (*Pearce*). Mus. S. G.

The specimens from Peru are much more highly coloured than the type.

Genus PIERELLA, Westw.

1. P. HYCETA, Hew. Exot. Butt. ii. *Hæt.* t. 1. f. 1 (1860).

Pozzuzo (*Pearce*). Mus. S. G.

Nauta and Yurimaguas (*Bartlett*). Mus. D.

"Not common; found in the darkest parts of the forest."—*E. B.*

2. P. DINDYMENE, Cram. (*Pap. d.*) Pap. Exot. iii. t. 198. f. F, G (1780).

Ucayali and Yurimaguas (*Bartlett*). Mus. D.

"Common in low moist parts of the dense forest."—*E. B.*

3. P. LAMIA, Sulz. Gesch. Ins. t. 18. f. 1 (1776).

Ucayali (*Bartlett*). Mus. S. G. & D.

4. P. ASTYOCHE, Erichs. (*Hæt. a.*) Schomb. Reisen, iii. p. 599 (1848).

Ucayali (*Bartlett*). Mus. S. G.

5. P. LENA, Linn. (*Pap. l.*) Syst. Nat. i. 2. p. 784 (1767).

Ucayali and Yurimaguas (*Bartlett*). Mus. S. G. & D.

"Very common."—*E. B.*

6. P. HORTONA, Hew. Trans. Ent. Soc. ser. 2, ii. p. 246, t. 23. f. 1 (1854).

Ucayali, Huallaga, and Yurimaguas (*Bartlett*). Mus. S. G. & D.

"Very common."—*E. B.*

Genus ANCHIPHLEBIA, Hübn.

A. TAYGETINA, Butl. Cat. Sat. B. M. p. 107, t. 5. f. 2 (1868).

Ucayali (*Bartlett*). Mus. S. G.

"Rare; found in the dense forest."—*E. B.*

Genus ANTIRRHŒA, Hübn.

A. PHILOPŒMEN, Feld. Wien. ent. Mon. vi. p. 425 (1862).

Pozzuzo (*Pearce*). Mus. S. G.

Genus ORESSINOMA, Westw.

1. O. TYPHLA, Doubl. & Hew. Gen. Diurn. Lep. t. 62. f. 5 (1851).

Valley of the Cosnipata (*H. Whitely*). Mus. S. G.
Huiro, ad alt. 4800 ped., valley of Santana (*H. Whitely*). Mus. D.

2. O. SORATA, Salv. & Godm. Ann. Nat. Hist. ser. 4, vol. ii. p. 144 (1868).

Huasampilla (*H. Whitely*). Mus. D.
One specimen only.

Genus EUPTYCHIA, Hübn.

1. E. HESIONE, Sulz. (*Pap. h.*) Gesch. Ins. p. 144, t. 17. f. 3, 4 (1776).

Muña (*Pearce*). Mus. S. G.
Ucayali (*Bartlett*). Mus. S. G. & D.
"Common; found about flowers on the banks of rivers and open ground."—*E. B.*

2. E. OCYPETE, Fab. (*Pap. o.*) Gen. Ins. p. 260 (1777).

Peru. Mus. D.

3. E. CAMERTA, Cram. (*Pap. c.*) Pap. Exot. iv. t. 295. f. F (1782).

Nauta (*Bartlett*). Mus. D.
"Common about the banks of rivers."—*E. B.*

4. E. ERIGONE, Butl. P. Z. S. 1866, p. 466, t. 39. f. 5.

Ucayali (*Bartlett*). Mus. D.
"Found in shady footpaths near villages."—*E. B.*

5. E. LIBYE, Linn. (*Pap. l.*) Syst. Nat. i. 2. p. 772 (1767).

Valley of Cosnipata (*H. Whitely*). Mus. D.

6. E. RUSTICA, Butl. Cat. Sat. B. M. p. 32, t. 1. f. 4 (1868).

Muña (*Pearce*). Mus. S. G.

7. E. HIEMALIS, Butl. P. Z. S. 1866, p. 494.

Ucayali (*Bartlett*). Mus. S. G.

Genus LYMANOPODA, Westw.

1. L. FERRUGINOSA, Butl. Cat. Sat. B. M. p. 169, t. 4. f. 3 (1868).

Valley of the Cosnipata (*H. Whitely*). Mus. S. G.
Huasampilla (*H. Whitely*). Mus. D.

2. L. VENOSA, Butl. Cat. Sat. B. M. p. 171, t. 4. f. 5 (1868).

Valley of the Cosnipata (*H. Whitely*). Mus. S. G.
Huasampilla (*H. Whitely*). Mus. D.

3. L. ACRÆIDA, Butl. Cat. Sat. B. M. p. 171, t. 4. f. 6 (1868).

Pozzuzo (*Pearce*). Mus. S. G.
Huasampilla (*Whitely*). Mus. D.

4. L. OCELLIFERA, Butl. Ann. Nat. Hist. 1873, xii. p. 219.

Huasampilla (*H. Whitely*). Mus. D.

5. L. RUBESCENS, Butl. Ann. Nat. Hist. 1873, xii. p. 219.

Huasampilla (*H. Whitely*). Mus. D.

Genus STEROMA, Westw.

1. S. ANDENSIS, Feld. Reise Nov. Lep. iii. p. 475 (1867).

Peru. Mus. D.

2. S. BEYA, Doub. Hew. Gen. D. L. t. 66. f. 6 (1851).

Huiro, valley of Santana (*H. Whitely*). Mus. D.

3. S. UMBRACINA, Butl. Ann. Nat. Hist. 1873, xii. p. 221.

Huasampilla (*H. Whitely*). Mus. D.

4. S. SUPERBA, Butl. Cat. Sat. B. M. p. 172, t. 5. f. 6 (1868).

Huasampilla (*H. Whitely*). Mus. D.

Genus PEDALIODES, Butl.

1. P. PANCIS, Hew. (*Pronophila p.*) Trans. Ent. Soc. ser. 3, vol. i. p. 8, t. 4. f. 26, 27 (1862).

Muña (*Pearce*). Mus. S. G.
Huasampilla (*H. Whitely*). Mus. D.

2. P. ANGULARIS, Butl. Cat. Sat. B. M. p. 176, t. 4. f. 7 (1868).

Peru. Mus. D.

3. P. PALLANTIAS, Hew. (*Pron. p.*) Exot. Butt. v. *Pron.* viii. f. 51, 59 (1874).

Muña (*Pearce*). Mus. S. G.

4. P. PORINA, Hew. Trans. Ent. Soc. ser. 3, vol. i. p. 9, t. 4. f. 28 (1862).

Muña (*Pearce*). Mus. S. G.
Huiro, valley of Santana (*H. Whitely*). Mus. D.
One specimen only.

5. P. ZOIPPUS, n. sp. (Plate XVIII. fig. 1.)

Upperside brown; anterior wing darkest in the middle; posterior wing with the inner margin and the anal angle rufous brown. Underside the same as above; posterior wing with several very indistinct white dots near the outer margin, and a submarginal dark brown line.

Exp. 1¾ inch.

Peru. Mus. D.

Genus Oxeoschistus, Butl.

O. pronax, Hew. (*Pron. p.*) Exot. Butt. ii. *Pron.* t. 2. f. 10, 11 (1860).

Pozzuzo (*Pearce*). Mus. S. G.
Huiro, valley of Santana (*H. Whitely*). Mus. D.

Genus Lasiophila, Feld.

1. L. cirta, Feld. Wien. ent. Mon. iii. p. 336, t. 6. f. 1 (1859).

Muña (*Pearce*). Mus. S. G.

2. L. orbifera, Butl. Cat. Sat. B. M. p. 182, t. 5. f. 6.

Huasampilla (*H. Whitely*). Mus. D.

3. L. phalæsia, Hew. (*Pron. p.*) Exot. Butt. iv. *Pron.* t. 3. f. 13, 14 (1868).

Valley of Cosnipata (*H. Whitely*). Mus. D.

Genus Dædalma, Hew.

D. whitelyi, n. sp. (Plate XVII. figs. 6 & 7.)

Upperside dark brown; both wings crossed parallel to and near the outer margin by a row of white spots. Underside very like *D. dorinda*, Feld., without so much of the white on the posterior wing; better figured than described.

Exp. 3¼ inches.

Huasampilla, ad alt. 10,000 ped. (*H. Whitely*). Mus. D.

The largest described species of *Dædalma*, and very distinct on the upperside.

Genus Pronophila, Westw.

1. P. thelebe, Doubl. & Hew. Gen. D. L. t. 60. f. 3 (1851).

Valley of Cosnipata (*H. Whitely*). Mus. D.

2. P. variabilis, Butl. Ann. Nat. Hist. 1873, p. 223.

Huasampilla (*H. Whitely*). Mus. D.

3. P. cordillera, Westw. Gen. D. L. p. 358, note (1851).

Peru. Mus. D.

Genus Taygetis, Hübn.

1. T. chrysogone, Doubl. & Hew. Gen. D. L. t. 4 (1851).

Pozzuzo (*Pearce*). Mus. S. G.

2. T. mermeria, Cram. (*Pap. m.*) Pap. Exot. i. t. 96. f. B (1779).

Yurimaguas (*Bartlett*). Mus. D.

"Common in the low parts of the dense forest."—*E. B.*

3. T. THAMYRA, Cram. (*Pap. t.*) Pap. Exot. iii. t. 242. f. B (1782).
Ucayali (*Bartlett*). Mus. D.
"A common species on the Ucayali."—*E. B.*

4. T. PENELEA, Cram. (*Pap. p.*) Pap. Exot. ii. t. 101. f. G (1779).
Yurimaguas (*Bartlett*). Mus. D.

5. T. MARPESSA, Hew. (*Debis? m.*) Exot. Butt. iii. *Deb.* t. 1. f. 2 (1862).
Nauta (*Bartlett*). Mus. D.

Genus CORADES, Doubl. & Hew.

1. C. IDUNA, Hew. Ann. Nat. Hist. ser. 2, vol. vi. p. 437 (1850).
Muña (*Pearce*). Mus. S. G.
Huasampilla (*H. Whitely*). Mus. D.

2. C. PANNONIA, Hew. Ann. Nat. Hist. ser. 2, vol. vi. p. 438, t. 10. f. 1 (1850).
Peru. Mus. D.

3. C. ULEMA, Hew. Ann. Nat. Hist. ser. 2, vol. vi. p. 438, t. 10. f. 3 (1850).
Muña (*Pearce*). Mus. S. G.

4. C. CISTENE, Hew. Exot. Butt. iii. *Cor.* t. 1. f. 4, 5 (1863).
Muña (*Pearce*). Mus. S. G.
Huasampilla (*H. Whitely*). Mus. D.

5. C. FUSCIPLAGA, Butl. Ann. Nat. Hist. 1873, xii. p. 224.
Huasampilla (*H. Whitely*). Mus. D.

6. C. FULMINALIS, Butl. Cist. Ent. p. 26 (1870).
Peru. Mus. D.

Genus BIA, Hübn.

B. ACTORION, Linn. (*Pap. a.*) Syst. Nat. i. 2. p. 794 (1767).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.
Ucayali (*Bartlett*). Mus. D.
"Common in low moist places in the dense forest upon rotten fruit" &c.—*E. B.*

Subfamily 4. MORPHINÆ, Butl.

Genus MORPHO, Fabr.

1. M. AURORA, Westw. Gen. D. L. p. 339. n. 9, note (1851).
Huasampilla (*H. Whitely*). Mus. D.

2. M. ZEPHYRITIS, Butl. Lepidoptera Exot. pl. 56. f. 3, 4, p. 156 (1873).
Paucartambo (*H. Whitely*). Type, Mus. D.
Mr. Whitely has only obtained a single specimen of this beautiful species; it is one of the finest things sent home by him.

3. M. LAMPHARIS, Butl. Ann. Nat. Hist. ser. 4, vol. xii. p. 225; Lep. Exot. pl. 56. f. 1, 2, p. 156 (1873).

Huasampilla (*H. Whitely*).

This I think a good species, though closely allied to *M. sulkowskyi*. Mr. Hewitson has lately received specimens sent by Mr. Buckley from Bolivia.

4. M. CÆRULEUS, Perry, Arcana (1811).

M. didus, Hoff. Stett. ent. Zeit. 1874, p. 355.

Peru (*Dr. Staudinger*). Mus. D.

Very distinct from *M. menelaus*, Linn., with which Mr. Kirby places it. I have seen many examples.

5. M. ALEXANDROVNA, Druce, Trans. Ent. Soc. 1874, p. 155.

Huasampilla (*H. Whitely*). Mus. D.

One specimen only.

6. M. ACHILLES, Linn. (*Pap. a.*) Mus. Ulr. p. 211 (1874).

Pozzuzo (*Pearce*). Mus. S. G.
Chamicuros (*Bartlett*). Mus. D.

"Found in the dense forest."—*E. B.*

7. M. HELENOR, Cram. Pap. Ex. i. t. 86. f. A, B (1779).

Pozzuzo (*Pearce*). Mus. S. G.

8. M. PATROCLUS, Feld. Wien. ent. Mon. v. p. 110. n. 105 (1861).

M. papirius, Hopff. Stett. ent. Zeit. 1874, p. 356.

Pozzuzo (*Pearce*). Mus. S. G.
Peru (*Dr. Staudinger*). Mus. D.

Subfamily 5. BRASOLINÆ, Bates.

Genus OPSIPHANES, Westw.

1. O. CASSIÆ, Linn. (*Pap. c.*) Mus. Ulr. p. 265 (1764).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

2. O. XANTHUS, Linn. (*Pap. x.*) *l. c.* p. 276.

Ucayali (*Bartlett*).

Genus CALIGO, Hübn.

1. C. IDOMENEUS, Linn. (*Pap. i.*) Mus. Ulr. p. 213 (1764).

Ucayali (*Bartlett*). Mus. S. G.

"In the dense forest."—*E. B.*

2. C. EUPHORBUS, Feld. (*Pavonia e.*) Wien. ent. Mon. vi. p. 123 (1862).

Ucayali (*Bartlett*). Mus. S. G.

3. C. DENTINA, Druce, Trans. Ent. Soc. 1874, p. 155.

Valley of Cosnipata (*H. Whitely*). Type, Mus. D.

Subfamily 6. ACRÆINÆ, Bates.

Genus ACRÆA, Fabr.

1. A. ANTEAS, Hew. Gen. D. L. t. 18. f. 5 (1848).
Peru (*Dr. Staudinger*). Mus. D.

2. A. TERPSINÆ, Feld. Wien. ent. Mon. vi. p. 78. n. 63 (1862).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

3. A. LAVERNA, Doubl. & Hew. Gen. D. L. t. 18. f. 4 (1848).
Huiro, valley of the Santana (*H. Whitely*). Mus. D.

4. A. GRISEATA, Butl. Cist. Ent. i. p. 170. n. 49 (1873).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

5. A. MUCIA, Hopff. Stett. ent. Zeit. 1874, p. 346.
Peru (*Dr. Staudinger*). Mus. D.

6. A. NICYLLA, Hopff. *l. c.* p. 346.
Peru (*Dr. Staudinger*). Mus. D.

7. A. CALLIANIRA, Hübn. Zutr. ex. Schmett. f. 845, p. 846 (1837).
Pozzuzo (*Pearce*). Mus. S. G.
Huiro, valley of the Santana (*H. Whitely*). Mus. D.

8. A. ERINOME, Feld. Wien. ent. Mon. v. p. 101 (1861).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.
Huasampilla and Hiro, valley of Santana (*H. Whitely*). Mus. D.

9. A. RADIATA, Hew. Ex. Butt. iv. *Acræa*, t. 6. f. 39–41 (1868).
Valley of Cosnipata (*H. Whitely*). Mus. D.

10. A. ABANA, Hew. Exot. Butt. iv. *Acræa*, t. 6. f. 35, 36 (1868).
Pozzuzo (*Pearce*). Mus. S. G.

Subfamily 7. HELICONINÆ, Butt.

Genus HELICONIUS, Latr.

1. H. ZOBEIDE, Butt. Ann. Nat. Hist. ser. 4. vol. iii. p. 18, t. 9. f. 3 (1869).
Ucayali (*Bartlett*). Type, Mus. D.
"Found upon flowers near villages."—*E. B.*

2. H. CLYTIA, Cram. (*Pap. c.*) Pap. Exot. i. t. 66. f. C. D (1779).
Ucayali (*Bartlett*). Mus. D.

3. H. RHEA, Cram. (*Pap. r.*) Pap. Exot. i. t. 54. f. C, D (1779).
Nauta and Ucayali (*Bartlett*). Mus. D.
Pozzuzo (*Pearce*). Mus. S. G.
"Found on the banks of rivers, very common."—*E. B.*

4. H. LEUCADIA, Bates, T. L. S. xxiii. p. 556 (1862).
Yurimaguas (*Bartlett*). Mus. D.

5. H. PERUVIANA, Feld. Wien. ent. Mon. iii. p. 396 (1859).
Peru. Mus. D.

6. H. DORIS, Linn. (*Pap. d.*) Mant. Plant. p. 536 (1771).
Santa Cruz (*Bartlett*). Mus. D.
"Not common."—*E. B.*

7. H. MELPOMENE, Linn. (*Pap. m.*) Mus. Ulr. p. 232 (1764).
Valley of Santana (*H. Whitely*), one specimen only; Ucayali (*Bartlett*); rare in Peru (*E. B.*). Mus. D.

8. H. THELXIOPE, Hübn. Samml. ex. Schmett. (1806–16).
Upper Ucayali (*Bartlett*). Mus. S. G.
"Not common; found about flowers near the villages."—*E. B.*

9. H. AGLAOPE, Feld. Wien. ent. Mon. vi. p. 79. n. 67 (1862).
Pozzuzo (*Pearce*); Ucayali (*Bartlett*). Mus. S. G.

10. H. BARTLETTI, n. sp. (Plate XVIII. fig. 2.)

Upperside (*male*) black; anterior wing with the base orange-red, crossed beyond the middle by a band of light yellow, from the costal margin to near the outer margin the band is broken and crossed by the nervules, which are black; posterior wing black, brownish on the costal margin, an orange-red streak in the cell, and six between the abdominal margin and the middle of the wing. Underside as above, with less red at the base of the anterior wing; abdomen black, the sides spotted with yellow. *Female* the same as the male, with all the orange-red markings wider, and a marginal row of small white spots on the underside of the posterior wing.

Exp. ♂ $2\frac{3}{4}$ inches, ♀ 3 inches.
Santa Cruz (*Bartlett*). Mus. D.
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

This species is allied to *Xanthocles*, Bates, a Demerara species, but quite distinct.

11. H. ESTELLA, Bates, Trans. Linn. Soc. xxiii. p. 650 (1862).
Ucayali (*Bartlett*). Mus. S. G.

12. H. XENOCLEA, Hew. Ex. Butt. i. *Helic.* t. 1. f. 1 (1852).
Peru (*Dr. Staudinger*). Mus. D.

13. H. TELESIPHE, Doubl. & Hew. Gen. D. L. t. 15. f. 2 (1847).
Huasampilla and Huiro, valley of Santana (*H. Whitely*). Mus. D.

14. H. ARISTONA, Hew. Exot. Butt. i. *Helic.* t. 1. f. 4 (1852).
Ucayali (*Bartlett*). Mus. D.
Pozzuzo (*Pearce*). Mus. S. G.

15. H. SISYPHUS, Salv. Ann. Nat. Hist. ser. 4. vol. vii. p. 413.
Valley of Cosnipata (*H. Whitely*). Type, Mus. S. G. & D.

16. H. AURORA, Bates, Trans. Linn. Soc. xxiii. p. 555 (1862).
Sarayacu, on the Upper Ucayali (*Bartlett*). Mus. D.
"Rare, found on the footpaths in the forest."—*E. B.*

17. H. ARCUELLA, Druce, Trans. Ent. Soc. 1874, p. 156.
Yurimaguas (*Bartlett*). Type, Mus. D.

Genus EUEIDES, Hübn.

1. E. HELICONIOIDES, Feld. Wien. ent. Mon. v. p. 102 (1861).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

2. E. UNIFASCIATUS, Butl. Syst. Ent. vol. i. p. 169. n. 46 (1873).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

3. E. LYBIA, Fabr. (*Pap. l.*) Syst. Ent. p. 460. n. 73 (1775).
Ucayali (*Bartlett*). Mus. D.
"Not common; flies about the villages."—*E. B.*

4. E. ALIPHERA, Godt. (*Ceth. a.*) Enc. Méth. ix. p. 246 (1819).
Santa Cruz, on the Huallaga (*Bartlett*). Mus. D.
Huiro, valley of Santana (*H. Whitely*). Mus. D.
"Plentiful about the villages."—*E. B.*

5. E. ISABELLA, Cram. (*Pap. i.*) Pap. Ex. iv. t. 350. f. C, D (1782).
Nauta and Upper Ucayali (*Bartlett*). Mus. D.
Valley of Cosnipata (*H. Whitely*). Mus. S. G.
"Rare; found about the banks of rivers."—*E. B.*

Subfamily 8. NYMPHALINÆ, Bates.

Genus COLŒNIS, Hübn.

1. C. DIDO, Linn. (*Pap. d.*) Syst. Nat. i. 2. p. 782 (1767).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.
Nauta (*Bartlett*). Mus. D.
"Not common."—*E. B.*

2. C. TELESIPHE, Hew. Trans. Ent. Soc. ser. 3, vol. v. p. 564 (1867).
Pozzuzo (*Pearce*). Mus. S. G.
Valley of Cosnipata and Huiro, valley of Santana (*H. Whitely*). Mus. D.

3. C. PHÆRUSA, Linn. (*Pap. p.*) Mus. Ulr. p. 293 (1764).
Ucayali (*Bartlett*). Mus. D.
"Found on flowers about the villages."—*E. B.*

4. C. JULIA, Fab. (*Pap. j.*) Syst. Ent. p. 509 (1775).

Cosnipata valley (*H. Whitely*). Mus. S. G. & D.
Ucayali (*Bartlett*). Mus. D.

"Common about the villages and on the mud-banks of the rivers."—*E. B.*

Genus AGRAULIS, Boisd.

1. A. JUNO, Cram. (*Pap. j.*) Pap. Exot. iii. 215. f. B, C (1782).

Pozzuzo (*Pearce*); valley of Cosnipata (*H. Whitely*). Mus. S. G.
Ucayali (*Bartlett*). Mus. D.
"Not common."—*E. B.*

2. A. LUCINA, Feld. Wien. ent. Mon. vi. p. 110 (1872).

Yurimaguas (*Bartlett*). Mus. D.
"Scarce."—*E. B.*

3. A. MONETA, Hübn. Samml. exot. Schmett. (1816–24).

Huiro, valley of Santana (*H. Whitely*). Mus. D.

4. A. GLYCERA, Feld. Wien. ent. Mon. v. p. 102 (1861).

Pozzuzo (*Pearce*). Mus. S. G.

Genus ERESIA, Boisd.

1. E. ELEPHIÆA, Hew. Ex. Butt. iv. p. 102 (1861).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

2. E. ANIETA, Hew. Ex. Butt. iii. *Eres.* t. 6. f. 33, 34 (1864).

Pozzuzo (*Pearce*). Mus. S. G.

3. E. PUSILLA, Salv. Ann. Nat. Hist. ser. 4, vol. iv. p. 172 (1869).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

4. E. PHÆDIMA, Salv. Ann. Nat. Hist. ser. 4, vol. ii. p. 146 (1868).

Pozzuzo (*Pearce*). Mus. S. G. & D.

5. E. THOMIOLA, Salv. Ann. Nat. Hist. ser. 4, p. 171 (1869).

Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

6. E. PERILLA, Hew. Exot. Butt. i. *Eres.* t. 1. f. 4 (1852).

Yurimaguas (*Bartlett*) and valley of Cosnipata (*H. Whitely*). Mus. D.

7. E. ACRÆINA, Hew. Ex. Butt. iii. *Eres.* t. 3. f. 15 (1864).

Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

8. E. MUNDINA, n. sp. (Plate XVIII. fig. 4.)

Upperside dark brown; anterior wing crossed beyond the middle by a broad red band. Underside: anterior wing, the base black, a red streak along the costal margin to the end of the cell, and a red band the same as above, the apex brownish white, crossed by the black nervules; posterior wing brownish white, all the nervules black.

Exp. 1¾ inch.

Huiro, valley of Santana (*H. Whitely*). Mus. D.

A most curious species, precisely like *Acræa erinome*, Feld., with which the single specimen sent by Mr. Whitely was mixed.

9. E. ACTINOTE, Salv. Ann. Nat. Hist. ser. 4, vol. iv. p. 171 (1869).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

10. E. POLINA, Hew. Exot. Butt. i. *Eres*. t. 7. f. 6 (1852).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

11. E. ANGUSTA, Hew. Ex. Butt. iv. *Eres*. t. 7. f. 58, 59 (1868).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

12. E. NAUPLIA, Linn. (*Pap. n.*) Mus. Ulr. p. 309 (1764).

Nauta (*Bartlett*). Mus. D.

"Found in the moist parts of the forest."—*E. B.*

13. E. CLARA, Bates, Journ. Ent. ii. p. 192 (1864).

Ucayali (*Bartlett*). Mus. S. G. & D.

"Found in the moist parts of the forest."—*E. B.*

14. E. NANA, Druce, Trans. Ent. Soc. 1874, p. 156.

Valley of Cosnipata, and Huiro, valley of Santana (*H Whitely*). Mus. D.

15. E. NUSSIA, n. sp. (Plate XVIII. fig. 5.)

Upperside dark brown; anterior wing with two white spots, one on the costal margin near the apex, the other below, nearest the anal angle; posterior wing powdered with ochraceous yellow, the outer margin dentated, and crossed beyond the middle with three ochreous bands. Underside the same as *E. nana*.

Exp. 1½ inch.

Peru. Mus. D.

16. E. PEARCEI, n. sp. (Plate XVIII. fig. 3.)

Upperside dark brown; anterior wing crossed beyond the middle from the costal margin to the inner margin by three broken bands of orange spots; posterior wing crossed in the middle by a wide orange-coloured band. Underside pale yellow, slightly speckled with brown.

Exp. 1 inch.

Pozzuzo (*Pearce*). Mus. S. G.

A beautiful little species, and very distinct from any other.

Genus SYNCHLOË, Doubl.

S. SAUNDERSII, Doubl. & Hew. Gen. D. L. t. 24. f. 2 (1847).

Pozzuzo (*Pearce*). Mus. S. G.

Genus EUREMA, Doubl.

1. E. KEFERSTEINII, Doubl. & Hew. Gen. D. L. t. 24. f. 4 (1847).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

2. E. DIONE, Latr. (*Van. d.*) Humb. Bonpl. Obs. Zool. ii. p. 87, t. 37. f. 1, 2 (1811–19).
Pozzuzo (*Pearce*). Mus. S. G.
Valley of Cosnipata, and Huiro, valley of the Santana (*H. Whitely*). Mus. D.

Genus JUNONIA, Hübn.

J. LAVINIA, Cram. (*Pap. l.*) Pap. Ex. i. t. 21. f. C, D (1775).
Nauta and Ucayali (*Bartlett*) ; Huiro, valley of Santana (*H. Whitely*). Mus. D.
"This species may be found basking in the sun all day long upon a red flower that grows about the villages and river-banks."—*E. B.*

Genus ANARTIA, Hübn.

1. A. JATROPHÆ, Linn. Mus. Ulr. p. 289 (1764).
Nauta and Upper Ucayali (*Bartlett*). Mus. S. G. & D.
"Very common, always to be seen about flowers in open places in the forest."—*E. B.*

2. A. AMALTHEA, Linn. (*Pap. a.*) Mus. Ulr. p. 288 (1764).
Nauta and Yurimaguas (*Bartlett*). Mus. D.
"Very common."—*E. B.*

Genus CYBDELIS, Boisd.

1. C. DIOTIMA, Hew. Exot. Butt. i. *Cybd.* t. 2. f. 8, 9 (1852).
Valley of Cosnipata (*H. Whitely*). Mus. D.
Huiro, valley of Santana (*H. Whitely*). Mus. D.

2. C. CECIDA, Hew. Ex. Butt. iv. *Cybd.* t. 4. f. 26, 27 (1869).
Lima. Mus. D.

3. C. WHITELYI, Butl. Ann. Nat. Hist. 1873, xii. p. 226.
Huasampilla (*H. Whitely*). Mus. D.

4. C. THRASYLLA, Feld. Wien. ent. Mon. iii. p. 397 (1859).
Huasampilla (*H. Whitely*). Mus. D.

Genus EUNICA, Hübn.

1. E. MYGDONIA, Godt. (*Nymph. m.*) Enc. Méth. ix. p. 416 (1823).
Nauta (*Bartlett*). Mus. D.
Cosnipata valley (*H. Whitely*). Mus. D.
"Found about the banks of rivers."—*E. B.*

2. E. TITHONIA, Feld. (*Faunia t.*) Reise Nov. Lep. iii. pp. 407, 613, t. 52. f. 6–8 (1867).
Chyabetes (*Bartlett*). Mus. D.

3. E. CINARA Hew. (*Cybd. c.*) Exot. Butt. i. *Cybd.* t. 1. f. 2 (1852).
Santa Cruz and Huallaga (*Bartlett*). Mus. D.
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

4. E. CELMA, Hew. (*Cybd. c.*) Exot. Butt. i. *Cybd.* t. 1 f. 3 (1852).
Huallaga (*Bartlett*). Mus. S. G.
Found on the forest footpaths near the river.

5. E. BECHINA, Hew. (*Cybd. b.*) Exot. Butt. i. *Cybd.* t. 2. f. 10 (1852).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

6. E. ELEGANS, Salv. Ann. Nat. Hist. ser. 4, vol. iv. p. 173 (1869).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

7. E. CARIAS, Hew. (*Cybd. c.*) Exot. Butt. ii. *Cybd.* t. 3. *f.* 21, 22 (1857).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

8. E. TENEBROSA, Salv. Ann. Nat. Hist. ser. 4, vol. iv. p. 173 (1869).
Pozzuzo (*Pearce*). Mus. S. G.

9. E. BRUNNEA, Salv. Ann. Nat. Hist. ser. 4, vol. iv. p. 174 (1869).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & E.

10. E. CARALIS, Hew. (*Pap. c.*) Exot. Butt. ii. *Cybd.* t. 3. f. 18, 19 (1857).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

11. E. CLYTIA, Hew. (*Cybd. c.*) Exot. Butt. i. *Cybd.* t. 1. f. 5, 6 (1852).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

12. E. ORPHISE, Cram. (*Pap. o.*) Pap. Ex. i. t. 42. f. E, F (1776).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

13. E. POMONA, Feld. (*Faun. p.*) Reise Nov. Lep. iii. p. 407, t. 52. f. 11, 12 (1867).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

14. E. EUROTA, Cram. (*Pap. e.*) Pap. Ex. ii. t. 136. f. C, D (1775).
Huallaga (*Bartlett*). Mus. S. G.

15. E. AMELIA, Cram. (*Pap. a.*) Pap. Exot. ii. t. 136. f. B, C (1779).
Huallaga (*Bartlett*). Mus. S. G.

16. E. NORICA, Hew. (*Cybd. n.*) Exot. Butt. i. *Cybd.* t. 2. f. 13 (1852).

Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

17. E. CHLOROCHROA, Salv. Ann. Nat. Hist. ser. 4, vol. iv. p. 172 (1869).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

"The species of this genus are found about the mud-banks of rivers and open forest-streams, also on the footpaths in the forest and near villages."—*E. B.*

Genus EPIPHILE, Doubl.

1. E. IBLIS, Feld. Wien. ent. Mon. v. p. 105 (1861).

Pozzuzo (*Pearce*); valley of Cosnipata (*H. Whitely*). Mus. S. G.

2. E. LAMPETHUSA, Doubl. & Hew. Gen. D. L. t. 27. f. 3 (1848).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

Genus EPICALIA, West.

E. NUMILIA, Cr. (*Pap. n.*) Pap. Exot. ii. t. 81. f. E, F (1779).

Pozzuzo (*Pearce*); valley of Cosnipata (*H. Whitely*). Mus. S. G.

Genus TEMENIS, Hübn.

1. T. ARIADNE, Cram. (*Pap. a.*) Pap. Exot. ii. t. 180. f. E, F (1779).

Ucayali (*Bartlett*); Pozzuzo (*Pearce*). Mus. S. G.
Chyavetos (*Bartlett*). Mus. D.

"Found upon leaves and flowers in the footpaths of the dense forest."—*E. B.*

2. T. PULCHRA, Hew. (*Paromia p.*) Exot. Butt. ii. *Epiphile*, t. 2. f. 1, 2. (1861).

Pozzuzo (*Pearce*). Mus. S. G.

The specimens of this species from Pozzuzo differ much from the typical form by not having the black band on the underside of the anterior wing, its larger size, and brighter colour. I at first thought it a distinct species; but upon comparison with the specimens in the British Museum, I find that they have a specimen clearly intermediate between the two forms.

Genus EUBAGIS, Boisd.

1. E. MÆON, Doubl. & Hew. Gen. D. L. t. 30. f. 1 (1849).

Yurimaguas (*Bartlett*). Mus. D.

2. E. GISELLA, Hew. Exot. Butt. ii. *Eub.* t. 11. f. 11, 12 (1859).

Yurimaguas (*Bartlett*); valley of Cosnipata (*H. Whitely*). Mus. D.

3. E. INES, Godt. (*Nymphalis i.*) Enc. Méth. ix. p. 421 (1823).

Huiro, valley of Santana (*H. Whitely*). Mus. D.

4. E. SERINA, Fabr. (*Pap. s.*) Syst. Ent. p. 497 (1775).
Ucayali (*Bartlett*). Mus. S. G.

5. E. SALPENSA, Feld. Wien. ent. Mon. vi. p. 113 (1862).
Pozzuzo (*Pearce*); valley of Cosnipata (*H. Whitely*). Mus. S. G.

6. E. RACIDULA, Hew. Exot. Butt. i. *Eub.* t. 1. f. 2, 3 (1852).
Ucayali (*Bartlett*). Mus. S. G.

"The species of this genus are always to be seen flying about the river-banks feeding upon rotten fruit" &c.—*E. B.*

Genus CALLICORE, Hübn.

1. C. ELUINA, Hew. (*Cat. e.*) Ex. Butt. i. t. 4. f. 30, 31 (1854).
Huasampilla, and Huiro, valley of Santana (*H. Whitely*). Mus. D.

2. C. CLYMENA, Cram. (*Pap. c.*) Pap. Ex. i. t. 24. f. E, F (1775).
Pozzuzo (*Pearce*). Mus. S. G.
Ucayali (*Bartlett*). Mus. D.

"Found on the mud-banks of the rivers upon decayed fruit."—*E. B.*

3. C. NEGLECTA, Salv. Ann. Nat. Hist. ser. 4, vol. iv. p. 176 (1869).
Pozzuzo (*Pearce*); valley of Cosnipata (*H. Whitely*). Mus. S. G.

4. C. LIDWINA, Feld. Wien. ent. Mon. vi. p. 114 (1862).
Pozzuzo (*Pearce*). Mus. S. G.
Valley of Cosnipata (*H. Whitely*). Mus. D.

Genus PERISAMA, Doubl.

1. P. OPPELII, Latr. (*Erycina o.*) Humb. Bonpl. Obs. Zool. i. p. 237, t. 24. f. 1, 5 (1811?).
Valley of Cosnipata (*H. Whitely*). Mus. D.

2. P. XANTHICA, Hew. (*Cat. x.*) Exot. Butt. iv. *Cat.* t. 11. f. 75, 76 (1868).
Peru (*Dr. Staudinger*). Mus. D.
Pozzuzo (*Pearce*). Mus. S. G.

3. P. MORONA, Hew. (*Cat. m.*) Ex. Butt. iv. *Cat.* t. 12. f. 93, 94 (1868).
Huasampilla (*H. Whitely*). Mus. D.
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

4. P. HILARA, Salv. Ann. Nat. Hist. ser. 4, vol. iv. p. 175 (1869).
Valley of Cosnipata, and Huiro, valley of Santana (*H. Whitely*). Mus. D.

5. P. VANINKA, Hew. (*Cat. v.*) Ex. Butt. i. *Cat.* t. 4. f. 32, 33 (1854).

Valley of Cosnipata and valley of Santana (*H. Whitely*). Mus. S. G. & D.

6. P. JURINEI, Gueneé, Lépid. du Mus. de Genève, p. 28. n. 36, pl. 1. f. 6.

Valley of Cosnipata (*H. Whitely*). Mus. D.

7. P. CANOMA, Druce, Trans. Ent. Soc. 1874, p. 156.

Huasampilla (*H. Whitely*). Type, Mus. D.
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

8. P. RHODOPTERA, Butl. Cist. Ent. vol. i. p. 162 (1873).

Huiro, valley of Santana (*H. Whitely*). Mus. D.

9. P. CAMELITA, Hew. (*Cat. c.*) Exot. Butt. vol. v. *Cat.* t. 13. f. 99, 100 (1876).

Huiro, valley of Santana (*H. Whitely*). Mus. D.

10. P. COMNENA, Hew. (*Cat. c.*) Exot. Butt. iv. *Cat.* t. 2. f. 77, 78 (1868).

Valley of Cosnipata and Huasampilla (*H. Whitely*). Mus. D.

11. P. OCHRIPENNIS, Butl. Cist. Ent. i. p. 161 (1873).

Huasampilla and valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

12. P. TRISTRIGOSA, Butl. Syst. Ent. vol. i. p. 161 (1873).

Valley of Cosnipata (*H. Whitely*). Mus. D. & S. G.
Huiro, valley of Santana (*H. Whitely*). Mus. D.

13. P. CHASEBA, Hew. (*Cat. c.*) Exot. Butt. *Cat.* t. 5. f. 34, 35 (1855).

Valley of Cosnipata, and Huiro, valley of Santana (*H. Whitely*). Mus. D.

Pozzuzo (*Pearce*). Mus. S. G.

14. P. CALAMIS, Hew. (*Cybd. c.*) Exot. Butt. iv. *Cyb.* t. 4. f. 23, 24 (1869).

Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

Genus CATAGRAMMA, Boisd.

1. C. ÆGINA, Feld. Wien. ent. Mon. v. p. 107 (1861).

Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

2. C. ZELPHANTA, Hew. Ex. Butt. ii. *Cat.* t. 8. f. 58, 59 (1858).

Pozzuzo (*Pearce*). Mus. S. G.

3. C. PASITHEA, Hew. Exot. Butt. iii. *Cat.* t. 10. f. 73, 74 (1864).
Ucayali (*Bartlett*); Pozzuzo (*Pearce*). Mus. S. G.
Valley of Cosnipata (*H. Whitely*). Mus. D.

4. C. FELDERI, Hew. Exot. Butt. iii. *Cat.* t. 10. f. 68, 69 (1874); N. *Cat.* t. 12. f. 96 (1868).
Pozzuzo (*Pearce*). Mus. S. G.

5. C. EXCELSIOR, Hew. Exot. Butt. ii. *Cat.* t. 7. f. 49, 50, t. 9. f. 64 (1858).
Peru. Mus. D.

6. C. PERISTERA, Hew. Exot. Butt. i. *Cat.* t. 2. f. 15–17 (1853).
Huallaga (*Bartlett*); Pozzuzo (*Pearce*). Mus. S. G.

7. C. CONOSURA, Doubl. & Hew. Gen. D. L. t. 28. f. 2 (1847).
Peru. Mus. D.

Genus CALLITHEA, Boisd.

1. C. DEGANDII, Hew. Exot. Butt. ii. *Call.* t. 2. f. 6–8 (1858).
Ucayali (*Bartlett*). Mus. D.

2. C. WHITELYI, Salvin, Ann. Nat. Hist. ser. 4, vol. iv. p. 179 (1869).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.
Huasampilla (*H. Whitely*). Mus. D.

3. C. DEPUISETI, Feld. (*Cyane, d.*) Wien. ent. Mon. v. 107 (1861).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

4. C. OPTIMA, Butl. Lep. Ex. i. p. 12, t. 5. f. 1, 2 (1869).
Santa Cruz (*Bartlett*). Mus. D. & S. G.

"The species of this genus are found associating with *Catagramma* upon the mud-banks of the rivers, feeding upon rotten fruit" &c.—*E. B.*

Genus CALLIZONA, Doubl.

C. FULVESCENS, Butl. Cist. Ent. vol. i. p. 162 (1873).
Pozzuzo (*Pearce*). Mus. S. G.

Genus PANDORA, Westw.

1. P. PROLA, Doubl. & Hew. Gen. D. L. t. 43. f. 5 (1850).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.
Chamicuros (*Bartlett*). Mus. D.

2. P. REGINA, Bates, Journ. Ent. ii. p. 213 (1864).
Pozzuzo (*Pearce*), and valley of Cosnipata (*H. Whitely*). Mus. S. G.
Ucayali (*Bartlett*). Mus. D.

"These beautiful Butterflies delight in sitting flat against the walls of houses and on the steep clay banks of the rivers; they were very abundant."—*E. B.*

Genus GYNÆCIA, Doubl.

G. DIRCE, Linn. (*Pap. d.*) Mus. Ulr. p. 287 (1764).
Ucayali (*Bartlett*). Mus. D.

"Found on the forest footpaths about the leaves of bushes and flowers."—*E. B.*

Genus AGERONIA, Hübn.

1. A. CHLOË, Stoll (*Pap. c.*) Supp. Cram. t. 5. f. 1, 1*a* (1787).
Ucayali (*Bartlett*). Mus. S. G.

2. A. FERENTINA, Godt. (*Nymp. f.*) Enc. Méth. ix. p. 428 (1823).
Huiro, valley of Santana (*H. Whitely*). Mus. D.

3. A. FERONIA, Linn. (*Pap. f.*) Mus. Ulr. p. 283 (1764).
Ucayali (*Bartlett*). Mus. D.

4. A. FORNAX, Hübn. Samml. ex. Schmett. (1816–24); Doubl. Hew. Gen. D. L. t. 10. f. 1 (1847).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

5. A. AMPHINOME, Linn. (*Pap. a.*) Syst. Nat. i. 2. p. 779 (1767).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

"The species of this genus are found on the bark of the trees which are covered with grey moss, to which they assimilate, usually near villages on the forest foot-paths."—*E. B.*

Genus DIDONIS, Fabr.

1. D. AGANISA, Boisd. Sp. Gén. i. t. 9. f. 7 (1836).
Ucayali (*Bartlett*). Mus. S. G.

2. D. BIBLIS, Fabr. (*Pap. b.*) Syst. Ent. p. 505 (1775).
Ucayali (*Bartlett*). Mus. D.

Genus OLINA, Westw.

O. OZECA, Doubl. & Hew. Gen. D. L. p. 407, t. 31. f. 31 (1848).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

Genus PYRRHOGYRA, Hübn.

1. P. NEÆREA, Linn. (*Pap. n.*) Mus. Ulr. p. 297 (1764).
Pozzuzo (*Pearce*). Mus. S. G.
Valley of Cosnipata (*H. Whitely*). Mus. D.

2. P. LYSANIAS, Feld. Wien. ent. Mon. vi. p. 115 (1862).
Pozzuzo (*Pearce*). Mus. S. G.

Genus TIMETES, Westw.

1. T. CORESIA, Godt. (*Nymph. c.*) Enc. Méth. ix. p. 359 (1823).
Pozzuzo (*Pearce*). Mus. S. G.
Valley of Cosnipata (*H. Whitely*). Mus. D.

2. T. NORICA, Hew. Exot. Butt. i. *Tim.* t. 1. f. 3, 4 (1852).
Ucayali (*Bartlett*). Mus. S. G. & D.

3. T. EGINA, Bates, Journ. Ent. ii. p. 329, t. 10. f. 1 (1865).
Ucayali (*Bartlett*). Mus. D.

4. T. TUTELINA, Hew. Exot. Butt. i. *Tim.* t. 1. f. 5 (1852).
Santa Cruz (*Bartlett*). Mus. S. G.
Yurimaguas (*Bartlett*). Mus. D.

5. T. LIVIUS, Kirb. (*T. berania*, Hew.) Exot. Butt. i. t. 1. f. 2 (1852); Staud. Verh. zool.-bot. Ges. 1875, p. 104.
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

6. T. CRETHON, Fabr. (*Pap. c.*) Gen. Ins. p. 252 (1777).
Ucayali (*Bartlett*). Mus. D.
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

7. T. CORINNA, Latr. (*Van. c.*) Humb. Bonpl. Obs. Zool. ii. p. 84, t. 36. f. 5, 6 (1819).
Pozzuzo (*Pearce*). Mus. S. G.
Huiro, valley of Santana (*H. Whitely*). Mus. D.

8. T. MARCELLA, Feld. Wien. ent.-Mon. v. p. 108 (1861).
Pozzuzo (*Pearce*). Mus. S. G.

9. T. HERMIONE, Feld. *l. c.* p. 97.
Pozzuzo (*Pearce*). Mus. S. G.
Ucayali (*Bartlett*). Mus. S. G. & D.
"One or other species of this genus was to be found in nearly all the localities I visited, on the mud-banks of the rivers and streams, feeding upon decayed fruit" &c.—*E. B.*

Genus VICTORINA, Blanch.

1. V. STENELES, Linn. (*Pap. s.*) Mus. Ulr. p. 218 (1764).
Pozzuzo (*Pearce*). Mus. S. G.

2. V. EPAPHUS, Latr. (*Van. e.*) Humb. & Bonpl. Obs. Zool. ii. p. 74, t. 35. f. 3, 4 (1811–19).
Valley of Cosnipata (*H. Whitely*); Yurimaguas (*Bartlett*). Mus. D.
Pozzuzo (*Pearce*). Mus. S. G.
"Found on the mud-banks."—*E. B.*

3. V. SULPITIA, Cram. (*Pap. s.*) Pap. Exot. iv. t. 328, f. A, B (1782).
Pozzuzo (*Pearce*); valley of Cosnipata (*H. Whitely*). Mus. S. G.
Nauta (*Bartlett*). Mus. D.
"Found about the footpaths of the forest on the leaves of bushes" &c.—*E. B.*

Genus HETEROCHROA, Boisd.

1. H. IPHICLA, Linn. (*Pap. i.*) Mus. Ulr. p. 311 (1764).
Nauta and Yurimaguas (*Bartlett*). Mus. D.

2. H. CALLIPHICLEA, Butl. Cat. Fabr. p. 58. n. 5 (1870).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.
Differs slightly from the type in the orange spot above.

3. H. EROSIA, Hew. Ann. Nat. Hist. xx. p. 259, t. 20. f. 3 (1847).
Yurimaguas (*Bartlett*). Mus. D.
Pozzuzo (*Pearce*), and valley of Cosnipata (*H. Whitely*). Mus. S. G.

4. H. XIMENA, Feld. Wien. ent. Mon. vi. p. 116 (1862).
Pozzuzo (*Pearce*). Mus. S. G.

5. H. ARICIA, Hew. Ann. Nat. Hist. xx. p. 263, t. 21. f. 11 (1847).
Valley of Cosnipata (*H. Whitely*). Mus. D.

6. H. CYTHEREA, Linn. (*Pap. c.*) Mus. Ulr. p. 305 (1764).
Ucayali and Yurimaguas (*Bartlett*). Mus. S. G. & D.

7. H. BOREAS, Butl. P. Z. S. 1865, p. 668. f. 2.
Valley of Cosnipata (*H. Whitely*). Mus. D.

8. H. ALALA, Hew. Ann. Nat. Hist. xx. p. 261, t. 21. f. 8 (1847).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.
Huiro, valley of Santana (*H. Whitely*). Mus. D.

9. H. TIZONA, Feld. Reise Nov. Lep. iii. p. 424 (1867).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

10. H. LARA, Hew. Ann. Nat. Hist. ser. 2, vol. vi. p. 437, t. 9. f. 8 (1850).
Pozzuzo (*Pearce*). Mus. S. G.

11. H. MESENTINA, Cram. (*Pap. m.*) Pap. Ex. ii. t. 162. f. B, C (1779).
Huallaga (*Bartlett*). Mus. S. G.
"These Butterflies I found on the leaves and flowers in the footpaths of the dense forest.—*E. B.*

Genus APATURA, Fabr.

1. A. CYANE, Latr. (*Nymph. c.*) Humb. Bonpl. Obs. Zool. ii. p. 82, t. 36. f. 3, 4 (1811–23).
Pozzuzo (*Pearce*), and valley of Cosnipata (*H. Whitely*). Mus. S. G.

2. A. PAVONII, Latr. (*Nymp. p.*) Humb. Bonpl. Obs. Zool. i. p. 197, t. 18. f. 34 (1811?).
Nauta (*Bartlett*). Mus. D.
"Found on the walls of houses and bushes in villages."—*E. B.*

3. A. AGATHINA, Cram. (*Pap. a.*) Pap. Exot. ii. t. 167. f. E, F (1782).
Ucayali (*Bartlett*). Mus. S. G.
Valley of Cosnipata (*H. Whitely*). Mus. D.
"Found about the villages and plantations of plantains, on the ripe fruit and decayed vegetable matter."—*E. B.*

4. A. ELIS, Feld. Wien. ent. Mon. v. p. 109. n. 100 (1861).
Pozzuzo (*Pearce*), and valley of Cosnipata (*H. Whitely*). Mus. S. G.
Huasampilla (*H. Whitely*). Mus. D.

5. A. SELINA, Bates, Journ. Ent. ii. p. 334. n. 139 (1865).
Sarayacu (*Bartlett*). Mus. D.
"Very rare, found about the villages."—*E. B.*

6. A. LINDA, Feld. Wien. ent. Mon. vi. p. 117. n. 119 (1862).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

7. A. GRISELDIS, Feld. Wien. ent. Mon. vi. p. 117. n. 120 (1862).
Nauta and Sarayacu (*Bartlett*). Mus. D.

8. A. LUCASII, Doubl. & Hew. Gen. D. L. t. 45. f. 2 (1850).
Huasampilla (*H. Whitely*). Mus. D.

9. A. CHERUTINA, Feld, Reise Nov. Lep. iii. p. 435 (1867).
Pozzuzo (*Pearce*), and valley of Cosnipata (*H. Whitely*). Mus. S. G.

10. A. LAVINIA, Butl. (*Chlorippe l.*) P. Z. S. 1866, p. 39, t. 3. f. 1.
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

11. A. ZUNILDA, Godt. (*Nymp. z.*) Enc. Méth. ix. p. 377 (1823).
Pozzuzo (*Pearce*). Mus. S. G.
"The species of this genus prefer the villages on account of the different kinds of fruit that are cultivated in and about them, also for the refuse which the Indians throw away."—*E. B.*

Genus AGANISTHOS, Boisd.

1. A. ORION, Fabr. (*Pap. o.*) Syst. Ent. p. 485 (1775).
Chyavitas (*Bartlett*). Mus. D.
Valley of Cosnipata. Mus. S. G. & D.
"About the borders of the dense forest."—*E. B.*

2. A. ACHERONTA, Fabr. (*Pap. a.*) Syst. Ent. p. 501 (1775).
Nauta (*Bartlett*). Mus. D.
Valley of Cosnipata (*H. Whitely*). Mus. S. G.
"Very common, in some places on the mud-banks I found these insects in patches of hundreds together, feeding upon the rotten fruit" &c.—*E. B.*

Genus PREPONA, Boisd.

1. P. LAERTES, Hübn. Samml. ex. Schmett. (1806–16).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

2. P. MEANDER, Cram. (*Pap. m.*) Pap. Exot. i. t. 12. f. A, B (1775).
Chamicuras (*Bartlett*). Mus. D.
"Very rare, found in the forest footpaths."—*E. B.*

3. P. LYCOMEDAS, Cram. (*Pap. l.*) Pap. Ex. ii. t. 158. f. D (1779).
Pozzuzo (*Pearce*). Mus. S. G.

4. P. PRÆNESTE, Hew. Exot. Butt. ii. *Prep.* t. 2. f. 7, 8 (1859).
Pozzuzo (*Pearce*). Mus. S. G.

Genus AGRIAS, Doubl.

A. SARDANAPALUS, Bates, Proc. Ent. Soc. ser. 2, vol. v. p. 111 (1860).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.
Peru (*Dr. Staudinger*). Mus. D.

Genus SMYRNA, Hübn.

S. BLOMFIELDIA, Fabr. (*Pap. b.*) Spec. Ins. ii. p. 84 (1781).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

Genus MEGISTANIS, Westw.

1. M. BŒOTUS, Doubl. Hew. Gen. D. L. t. 48. f. 2 (1850).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

2. M. DEUCALION, Feld. Wien. ent. Mon. iv. p. 238 (1860).
Chamicuras (*Bartlett*). Mus. D.
"Plentiful about mud-banks."—*E. B.*

Genus HYPNA, Hübn.

H. CLYTEMNESTRA, Cram. (*Pap. c.*) Pap. Exot. ii. t. 137. f. A B (1779), iv. t. 364. f. A, B.
Pozzuzo (*Pearce*). Mus. S. G.

Genus PAPHIA, Fabr.

1. P. EURYPHYLE, Feld. (*Nymp. e.*) Wien. ent. Mon. vi. p. 119 (1862).
Pozzuzo (*Pearce*). Mus. D.

2. P. PHIDILE, Hübn. Zutr. exot. Schmett. f. 905, 906 (1837).
Ucayali (*Bartlett*). Mus. D.
"Found about the river-banks and villages."—*E. B.*

3. P. ERYTHEMA, Bates, Journ. Ent. ii. p. 342 (1865).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

4. P. CHRYSOPHANA, Bates, Ent. Mo. Mag. iii. p. 152 (1866).
Yurimaguas (*Bartlett*). Mus. D.

5. P. NESSUS, Latr. (*Nymp. n.*) Humb. Bonp. Obs. Zool. ii. p. 76, t. 35. f. 5, 6 (1811–23).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

6. P. TYRIANTHINA, Salv. & Godm. Ann. Nat. Hist. ser. 4, vol. ii. p. 148. n. 17 (1868).
Huasampilla (*H. Whitely*). Mus. D.

7. P. GLYCERIUM, Doubl. & Hew. Gen. D. L. t. 50. f. 1 (1850).
Nauta (*Bartlett*). Mus. D.

8. P. XENOCLES, Westw. Gen. D. L. p. 319. n. 11, note (1850).
Huasampilla (*H. Whitely*). Mus. D.

9. P. XENOCRATES, Westw. *l. c.* n. 13.
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

10. P. MORVUS, Fabr. (*Pap. m.*) Syst. Ent. p. 484 (1775).
Nauta (*Bartlett*). Mus. D.

11. P. GLAUCE, Feld. (*Nymp. g.*) Wien. ent. Mon. vi. p. 119 (1862).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

12. P. PHANTES, Hoff. Stett. ent. Zeit. 1874, p. 353. n. 57.
Peru (*Dr. Staudinger*). Mus. D.
A very distinct species.

13. P. ALBERTA, n. sp. (Plate XVIII. fig. 6.)

Upperside blue-black; anterior wing with the base, a large spot crossing the wing at the apex, and two smaller spots near the anal angle, greyish blue; posterior wing thickly irrorated with greyish blue. Underside glossy brown, thickly speckled with dark and light brown markings.

Exp. $2\frac{3}{4}$ inches.
Peru. Mus. D.

14. P. CYANEA, Salv. & Godm. Ann. Nat. Hist. ser. 4, vol. ii. p. 148 (1868).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

15. P. APPIAS, Hübn. (*Cor. a.*) Samml. exot. Schmett. (1816–41).
Ucayali (*Bartlett*). Mus. S. G.
"The species of this genus are generally found about the river-banks, near villages and forest-streams."—*E. B.*

Genus Siderone, Hübn.

S. thebais, Feld. Wien. ent. Mon. vi. p. 422 (1862).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

The specimen differs slightly from Felder's type by having the red band of the posterior wing broken into spots.

Genus Protogonius, Hübn.

P. cecrops, Doubl., var. æquatorialis, Butl. P. Z. S. 1875, p. 35, pl. v. f. i.

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

The specimen differs from the variety named by Mr. Butler by wanting the yellow spots near the outer margin of the anterior wing, and would, without doubt, be considered a distinct species by some; but I should be very sorry to describe it, not having yet seen any two specimens alike.

Family II. LEMONIIDÆ.

Subfamily 1. Libytheinæ, Bates.

Genus Libythea, Fabr.

L. carinenta, Cram. (*Pap. c.*) Pap. Exot. ii. t. 108. f. E, F (1782).

Ucayali (*Bartlett*). Mus. D.

"Found in the forest footpaths."—*E. B.*

Family III. ERYCINIDÆ.

Subfamily 1. Nemeobiinæ, Bates.

Genus Eurybia, Hübn.

1. E. salome, Cram. (*Pap. s.*) Pap. Exot. i. t. 12. f. G, H (1775).

Ucayali (*Bartlett*). Mus. S. G.

2. E. dardus, Fabr. (*Pap. d.*) Mant. Ins. ii. p. 30 (1787).

Nauta and Lower Ucayali (*Bartlett*). Mus. D.

"Common in the dense forest upon dead leaves and rubbish."—*E. B.*

3. E. donna, Feld. Wien. ent. Mon. vi. p. 410 (1862).

Pozzuzo (*Pearce*). Mus. S. G.

The specimen from Peru differs slightly in the width of the red of the posterior wing, and the black spots being smaller than they are in the Bogota specimens in my collection.

4. E. lamia, Cram. (*Pap. l.*) Pap. Exot. ii. t. 150. f. C (1779).

Pozzuzo (*Pearce*). Mus. S. G.

5. E. halimede, Hübn. (*Lim. subt. h.*) Samml. ex. Schmett. (1806–16).

Ucayali (*Bartlett*). Mus. S. G.

Genus MESOSEMIA, Hübn.

1. M. ULRICA, Cram. (*Pap. u.*) Pap. Exot. ii. t. 100. f. E, F (1782).

Pozzuzo (*Pearce*). Mus. S. G.
Nauta (*Bartlett*). Mus. D.
"Found in the forest footpaths."—*E. B.*

2. M. JUDICALIS, Butl. Trans. Ent. Soc. 1874, p. 430.

Ucayali (*Bartlett*). Type, Mus. D.

Subfamily 2. EURYGONINÆ, Bates.

Genus EURYGONA, Boisd.

E. EUTYCHUS, Hew. Exot. Butt. t. 5. f. 44–46 (1856).

Eucayali (*Bartlett*); Pozzuzo (*Pearce*). Mus. S. G.
"In the dense forest."—*E. B.*

Subfamily 3. ERYCININÆ, Bates.

Genus THERMONE, Westw.

T. PAIS, Hübn. (*Heluo p.*) Samml. ex. Schmett. (1816–41).

Pozzuzo (*Pearce*). Mus. S. G.

Genus NOTHEME, Westw.

N. EUMEUS, Fabr. (*Pap. e.*) Spec. Ins. ii. p. 63 (1781).

Nauta (*Bartlett*). Mus. D.

Genus PANARA, Westw.

P. PHERECLUS, Linn. Syst. Nat. i. 2. pp. 792, 248 (1767).

Ucayali (*Bartlett*). Mus. S. G.

Genus LYMNAS, Blanch.

L. ZOEGA, Hew. Exot. Butt. i. *Lim.* t. 1. f. 2 (1852).

Pozzuzo (*Pearce*). Mus. S. G.

This species varies much in the width of the orange border of the hind wings.

Genus LYROPTERYX, Westw.

L. APPOLLONIA, Westw. Gen. Diurn. Lep. p. 433. n. 1, note, t. 72. f. 1 (1851).

Valley of Cosnipata (*H. Whitely*). Mus. D. & S. G.
Pozzuzo (*Pearce*). Mus. S. G.

Genus NECYRIA, Westw.

1. N. SAUNDERSII, Hew. (*Eryc. s.*) Trans. Ent. Soc. ser. 2, ii. p. 245, t. 22. f. 1 (1854).

Pozzuzo (*Pearce*). Mus. S. G.

2. N. WHITELYANA, Druce, Trans. Ent. Soc. 1874, p. 159.

Huasampilla (*H. Whitely*). Type, Mus. D.
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

Genus ERYCINA, Fab.

1. E. MELIBŒUS, Fabr. (*Pap. m.*) Gen. Ins. p. 271 (1777).

Pozzuzo (*Pearce*). Mus. S. G.
Yurimaguas (*Bartlett*). Mus. D.
"On mud-banks and forest footpaths."—*E. B.*

2. E. AULESTES, Cram. (*Pap. a.*) Pap. Exot. ii. t. 128. f. G (1779).

Ucayali (*Bartlett*). Mus. S. G.

3. E. COLUBRA, Saund. Trans. Ent. Soc. ser. 2, v. p. 103, t. 11. f. 12 (1859).

Valley of the Cosnipata (*H. Whitely*). Mus. S. G.

Genus DIORHINA, Morisse.

1. D. PERIANDER, Cram. (*Pap. p.*) Pap. Exot. ii. t. 188. f. C (1779).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.
Ucayali (*Bartlett*). Mus. D.
"On mud-banks and forest footpaths."—*E. B.*

2. D. PSECAS, Saund. Trans. Ent. Soc. v. p. 219, t. 20. f. 4, 4 *a* (1849).

Ucayali (*Bartlett*). Mus. D.

Genus ZEONIA, Swains.

Z. SYLPHINA, Bates, Journ. Linn. Soc. Zool. ix. p. 383 (1868).

Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.
Differs from the type in having the crimson streak along the abdominal margin bright orange.

Genus ITHOMEIS, Bates.

I. MIMICA, Bates, Trans. Linn. Soc. xxiii. p. 542, note, n. 4 (1862).
Sarayacu (*Bartlett*). Mus. S. G.

Genus CHAMÆLIMNAS, Feld.

C. BRIOLA, Bates, Journ. Linn. Soc. Zool. ix. p. 379 (1868).

Ucayali (*Bartlett*). Mus. D.
"Forest footpaths."—*E. B.*

Genus ORESTIA, Feld.

O. VITULA, Hew. (*Limnas v.*) Exot. Butt. i. *Lim.* t. 1. f. 5 (1852).
Yurimaguas (*Bartlett*). Mus. D.
"Forest footpaths."—*E. B.*

Genus SISEME, Westw.

1. S. PALLAS, Latr. (*Eryc. p.*) Humb. Bonpl. Obs. Zool. i. p. 244, t. 24. f. 5, 6 (1811?).

Huasampilla (*H. Whitely*). Mus. D.

2. S. CAUDALIS, Bates, Journ. Linn. Soc. Zool. ix. p. 384 (1868).

Huasampilla, and Huiro, valley of the Santana (*H. Whitely*). Mus. D.

3. S. LUCILIUS, Hopff. Stett. ent. Zeit. 1874, p. 363.

Huiro, valley of the Santana (*H. Whitely*). Mus. D.
A very distinct species.

4. S. MILITARIS, Hopff. (*Lasaia m.*) Stett. ent. Zeit. 1874, p. 365.

S. leculenta, Erschoff.
Peru (*Dr. Staudiger*). Mus. D.
A beautiful species, and very distinct from any that I am acquainted with.

Genus RIODINA, Westw.

R. LYSIPPUS, Linn. (*Pap. l.*) Mus. Ulr. p. 332 (1764).

Ucayali (*Bartlett*). Mus. D.

Genus AMARYNTHIS, Hübn.

A. MENERIA, Cram. (*Pap. m.*) Pap. Exot. i. t. 94. f. D, E (1779).

Huallaga and Ucayali (*Bartlett*); Pozzuzo (*Pearce*). Mus. S. G.
Nauta (*Bartlett*). Mus. D.

Genus ANTEROS, Hübn.

A. BRACTEATA, Hew. Exot. Butt. iii. *Ant.* t. 1. f. 11, 12 (1867).

Ucayali (*Bartlett*). Mus. S. G.

Genus EMESIS, Fabr.

E. MANDANA, Cram. (*Pap. m.*) Pap. Exot. iii. t. 271. f. E, F (1782).

Pozzuzo (*Pearce*); valley of the Cosnipata (*H. Whitely*). Mus. S. G.

Genus CHARIS, Hübn.

C. CÆCIAS, Hew. Exot. Butt. iii. *Char.* t. 1. f. 2 (1866).

Pozzuzo (*Pearce*). Mus. S. G.

Genus BŒOTIS, Hübn.

B. BACÆNIS, Hew. Exot. Butt. v. *Erycinidæ, Bœot.* f. 1 (1874).

Valley of the Cosnipata (*H. Whitely*). Mus. S. G.
Huiro, valley of the Santana (*H. Whitely*). Mus. D.

Genus LASAIA, Bates.

L. MERIS, Cram. (*Pap. m.*) Pap. Exot. iv. t. 366. f. B, C (1782).

Valley of the Cosnipata (*H. Whitely*). Mus. S. G.
Nauta and Yurimaguas (*Bartlett*). Mus. D.
"Common about the banks of rivers and villages."—*E. B.*

Genus NYMPHIDIUM, Fabr.

1. N. CARICÆ, Linn. (*Pap. c.*) Mus. Ulr. p. 324 (1764).

Ucayali (*Bartlett*). Mus. S. G.

2. N. ASCOLIA, Hew. Exot. Butt. i. *Nymph.* t. 1. f. 4 (1852).

Pozzuzo (*Pearce*). Mus. S. G.

3. N. MELOPE, Hübn. (*Lim. subt. m.*) Samml. ex. Schmett. (1806–1816).

Ucayali (*Bartlett*). Mus. D.
"Frequents the forest footpaths."—*E. B.*

Genus URANEIS, Bates.

U. HYALINA; Butl. Journ. Linn. Soc. Zool. ix. p. 225, t. 6. f. 26 (1867).

Pozzuzo (*Pearce*). Mus. S. G.

Genus STALACHTIS, Hübn.

1. S. PHLEGIA, Cram. (*Pap. p.*) Pap. Exot. iii. t. 197. f. F, t. 236. f. C (1782).

Ucayali (*Bartlett*). Mus. S. G.

2. S. CALLIOPE, Linn. (*Pap. c.*) Mus. Ulr. p. 223 (1764).

Ucayali (*Bartlett*). Mus. S. G.

3. S. EUTERPE, Linn. (*Pap. e.*) Mus. Ulr. p. 226 (1764).

Nauta and Upper Ucayali (*Bartlett*). Mus. S. G. & D.
"All the species of *Stalachtis* are found on the forest footpaths." —*E. B.*

Family IV. LYCÆNIDÆ, Steph.

Genus LYCÆNA, Fabr.

1. L. HANNO, Stoll (*Pap. h.*) Suppl. Cram. t. 39. f. 2, 2 B (1790).

Pozzuzo (*Pearce*). Mus. S. G.

2. L. ——, sp.?

Huiro, valley of Santana (*H. Whitely*). Mus. D.

3. L. KOÁ, n. sp. (Plate XVIII. fig. 7.)

Upperside dark violet-blue, with the outer margins brown. Underside pale brown, darkest at the base of the wings; anterior wing with two white streaks at the end of the cell and two fine white broken lines crossing from the costal margin to the inner margin; posterior wing with a silver-white streak from the base to the apex nearest to the costal margin, a broad white spot beyond the middle nearest the anal angle.

Exp. $\frac{3}{4}$ inch.

Pozzuzo (*Pearce*). Type, Mus. S. G.

A beautiful little species, of which Mr. Pearce only obtained two or three specimens.

Genus Thecla, Fabr.

1. T. luxurina, Feld. Reise Nov. Lep. p. 262, t. 32. f. 21, 22 (1865).

Pozzuzo (*Pearce*). Mus. S. G.

2. T. marsyas, Linn. (*Pap. m.*) Mus. Ulr. p. 315 (1784).

Pozzuzo (*Pearce*). Mus. S. G.

3. T. gibberosa, Hew. Ill. Diurn. Lep. p. 85, t. 33. f. 48, 49 (1867).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

4. T. meton, Cram. (*Pap. m.*) Pap. Exot. iii. t. 201. f. D, E (1782).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

5. T. strephon, Fabr. (*Pap. s.*) Syst. Ent. p. 522 (1775).

Upper Ucayali (*Bartlett*). Mus. S. G. & D.

6. T. paphlagon, Feld. (*Pseud. p.*) Reise Nov. Lep. ii. p. 249, t. 31. f. 10, 11 (1865).

Huasampilla, ad alt. 10,000 ped. (*H. Whitely*). Mus. D.

7. T. ocrisia, Hew. Desc. Lyc. p. 5 (1868); Ill. Diurn. Lep. p. 123, t. 48. f. 235, 236 (1869).

Huiro, valley of Santana (*H. Whitely*). Mus. D.

One specimen only.

8. T. beon, Cram. (*Pap. b.*) Pap. Exot. iv. t. 319. f. B, C (1782).

Santa Cruz (*Bartlett*). Mus. D.

"Forest footpaths."—*E. B.*

Family V. PAPILIONIDÆ.

Subfamily 1. Pierinæ, Bates*.

Genus Pereute, Herr.-Schäff.

1. P. charops, Boisd. (*Eut. c.*) Sp. Gén. i. p. 407, t. 18. f. 1 (1836).

Pozzuzo (*Pearce*). Mus. S. G.

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* I have arranged the *Pierinæ* according to Mr. Butler's paper on that subfamily in 'Cistula Entomologica,' vol. i. pp. 33–58.

2. P. TELTHUSA, Hew. (*Eut. t.*) Exot. Butt. ii. *Eut.* t. 1. f. 1, 3 (1860).

Pozzuzo (*Pearce*). Mus. S. G.

3. P. CALLINICE, Feld. (*Eut. c.*) Wien. ent. Mon. v. p. 7, 9 (1861).

Cosnipata (*Whitely*). Mus. D.

Genus LEODONTA, Butl.

L. ZENOBINA, Hopff. Stett. ent. Zeit. 1869, p. 429, 1874, p. 331.

Cosnipata (*Whitely*). Mus. S. G.
Peru (*Dr. Staudinger*). Mus. D.

Genus MYLOTHRIS, Hübn.

1. M. PYRRHA, Fabr. (*Pap. p.*) Syst. Ent. p. 464 (1775).

Huallaga (*Bartlett*). Mus. S. G.
Huasampilla (*H. Whitely*). Mus. D.

2. M. LORENA, Hew. (*Pier. l.*) Exot. Butt. i. *Pier.* t. 1. f. 7 (1852).

Nauta and Upper Ucayali (*Bartlett*). Mus. D.
"Very common."—*E. B.*

Genus HESPEROCHARIS, Felder.

1. H. NEREIS, Feld. Reise Nov. Lep. ii. p. 146 (1865).

Cosnipata valley (*Whitely*). Mus. S. G.

2. H. NEREINA, Hopff. Stett. ent. Zeit. 1874, p. 336.

Cosnipata valley (*Whitely*); Peru (*Dr. Staudinger*). Mus. D.

3. H. CATAGRAMMA, Koll. (*Pier. c.*) Denkschr. Akad. Wiss. Wien. math.-nat. Cl. i. p. 361 (1850).

Cosnipata valley (*Whitely*). Mus. S. G.
Huiro, 4800 ft.; valley of the Santana (*Whitely*). Mus. D.

Genus CATASTICTA, Butler.

1. C. NOTHA, Luc. (*Eut. n.*) Rev. Zool. 1852, p. 195.

Cosnipata valley (*H. Whitely*). Mus. D.

2. C. SISAMNUS, Fab. (*Pap. s.*) Ent. Syst. iii. 1. p. 44 (1793).

Pozzuzo (*Pearce*) and valley of the Cosnipata (*H. Whitely*). Mus. S. G.

3. C. MANCO, Doub. (*Eut. m.*) Ann. Nat. Hist. ser. 2, i. p. 121 (1848).

Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

Genus SPHÆNOGONA, Butler.

1. S. SALOME, Feld. (*I. s.*) Wien. ent. Mon. v. p. 84 (1861).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

2. S. CONSTANTIA, Feld. Reise Nov. Lep. ii. p. 200 (1865).
Huiro, 4800 ft. elevation, valley of the Santana (*H. Whitely*). Mus. D.

Genus TERIAS, Swainson.

1. T. ALBULA, Cram. (*Pap. a.*) Pap. Exot. i. t. 27. f. E (1775).
Ucayali (*Bartlett*). Mus. S. G.
Yurimaguas (*Bartlett*). Mus. D.

2. T. ELATHEA, Cram. (*Pap. e.*) Pap. Exot. ii. t. 99. f. C, D (1779).
Valley of Cosnipata (*Whitely*). Mus. D.

3. T. ÆQUATORIALIS, Feld. Wien. ent. Mon. v. p. 85 (1861).
Huira, 4800 ft. elevation, valley of Santana (*H. Whitely*). Mus. D.
The type was from Ecuador.

4. T. FLAVILLA, Bates, Journ. Ent. i. p. 241. n. 4 (1861).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

5. T. RETICULATA, Butl. P. Z. S. 1871, p. 539.
Valley of Cosnipata (*H. Whitely*). Mus. S. G.
Huasampilla ad alt. 10,000 ped., Huiro ad alt. 4,800 ped., valley of Santana (*H. Whitely*). Mus. D.

Genus LEPTOPHOBIA, Butler.

1. L. ELEONE, Doubl. (*Pier. e.*) Gen. Diurn. Lep. t. 6. f. 6 (1847).
Valley of Cosnipata (*H. Whitely*). Mus. D.

2. L. CINEREA, Hew. (*Pier. c.*) Trans. Ent. Soc. ser. 3, v. p. 563 (1847).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

3. L. PHILOMA, Hew. (*Pier. p.*) Equat. Lep. p. 79 (1870).
Pozzuzo (*Pearce*). Mus. S. G.

Genus AMYNTHIA, Swainson.

A. MENIPPE, Hübn. Samml. ex. Schmett. (1806–1816).
Ucayali (*Bartlett*). Mus. D.
" Common everywhere."—*E. B.*

Genus CALLIDRYAS, Boisd.

1. C. EUBULE, Linn. (*Pap. eub.*) Syst. Nat. i. 2. p. 743 (1766).
Ucayali (*Bartlett*). Mus. D.
" Common on the Huallaga and in the whole of East Peru visited by me."—*E. B.*

2. C. CIPRIS, Fab. (*Pap. cip.*) Ent. Syst. iii. 1. p. 212 (1793).
Valley of Cosnipata (*H. Whitely*). Mus. D.

3. C. RURINA, Feld. Wien. ent. Mon. v. p. 82 (1861).
Huiro ad alt. 4800 ped., valley of Santana (*H. Whitely*). Mus. D.

One specimen only.

4. C. PHILEA, Linn. (*Pap. ph.*) Syst. Nat. i. 2. p. 764 (1776).
Upper Ucayali (*Bartlett*). Mus. D.
"Not common."—*E. B.*

5. C. ARGANTE, Fab. (*Pap. a.*) Syst. Ent. p. 470 (1775).
Upper and Lower Ucayali (*Bartlett*). Mus. S. G. & D.
"Very abundant."—*E. B.*

6. C. TRITE, Linn. (*Pap. t.*) Syst. Nat. i. 2. p. 763 (1766).
Upper Ucayali (*Bartlett*). Mus. D.

7. C. STATIRA, Cram. (*Pap. s.*) Pap. Exot. ii. t. 120. f. C, D (1779).
Upper and Lower Ucayali (*Bartlett*). Mus. S. G. & D.

"The species of this genus are very abundant at certain seasons; they may be found by thousands on mud-banks of rivers, mingled with *Pieris*, *Papilio*, and others."—*E. B.*

Genus PIERIS, Boisd.

1. P. DEMOPHILE, Linn. (*Pap. d.*) Syst. Nat. i. 2. p. 761 (1767).
Nauta and Upper Ucayali (*Bartlett*). Mus. D.

2. P. PISONIS, Hew. Exot. Butt. ii. t. 6. f. 40, 41 (1861).
Nauta and Upper Ucayali (*Bartlett*). Mus. S. G. & D.

3. P. DIANA, Feld. Wien. ent. Mon. v. p. 81 (1861).
Nauta (*Bartlett*). Mus. D.

"*Pieris* is generally distributed over the whole of East Peru; and some of the species are extremely common on the mud-banks of the rivers, where they assemble in patches of hundreds together. It is puzzling to the traveller what becomes of the females. The whole of the four years I was in Peru I only obtained about six females of all the species of the genus *Pieris*; the males I collected by hundreds."—*E. B.*

Genus APPIAS, Hübn.

1. A. ILAIRE, Godt. (*Pap. i.*) Enc. Méth. ix. p. 142 (1819).
Nauta (*Bartlett*). Mus. D.
"Very common."—*E. B.*

2. A. DRUSILLA, Cram. (*Pap. d.*) Pap. Exot. ii. t. 207. f. C (1779).
Valley of Cosnipata (*H. Whitely*). Mus. D. & S. G.

Genus DAPTONOURA, Butl.

1. D. PANTOPORIA, Hübn. (*Myl. p.*) Samml. exot. Schmett. (1816, 1841).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

2. D. LEUCANTHE, Feld. (*Pier. l.*) Wien. ent. Mon. v. p. 82 (1861).

Pozzuzo (*Pearce*); Valley of Cosnipata (*H. Whitely*). Mus. S. G.
Huasampilla, ad alt. 10,000 ped. (*H. Whitely*). Mus. D.

Genus SYNCHLOË, Hübn.

S. MONUSTA, Linn. (*Pap. m.*) Mus. Ulr. p. 237 (1764).

Chamicuras (*Bartlett*). Mus. D.

Genus DISMORPHIA, Hübn.

D. NEMESIS, Latr. (*Pier. n.*) Humb. Bonpl. Obs. Zool. ii. p. 78, t. 35. f. 7, 8 (1811–1819).

Huiro, ad alt. 4,800 ped.; valley of Santana (*H. Whitely*). Mus. D.

Genus MOSCHONEURA, Butl.

1. M. EUMELIA, Cram. (*Pap. e.*) Pap. Exot. iii. t. 280. f. D (1782).

Yurimaguas (*Bartlett*). Mus. S. G. & D.
"In low moist parts of the forest, flying with *Ithomia*."—*E. B.*

2. M. THEUGENIS, Doubl. (*Lep. t.*) Ann. Nat. Hist. ser. 2, i. p. 124 (1848).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.
Huasampilla (*H. Whitely*). Mus. D.

3. M. THERMESIA?, Godt. (*Pier. t.*) Enc. Méth. ix. p. 164 (1819).

Huiro, ad alt. 4800 ped.; valley of Santana (*H. Whitely*). Mus. D.

4. M. PENIA, Hopff. (*Lep. p.*) Stett. ent. Zeit. 1874, p. 334.

Peru (*Dr. Staudinger*). Mus. D.
Valley of Cosnipata (*H. Whitely*). Mus. S. G.
Mr. Salvin's specimen is not so yellow on the underside, but does not differ in any other respect.

Subfamily 2. PAPILIONINÆ, Swains.

Genus PAPILIO, Linn.

1. P. SESOSTRIS, Cram. Pap. Exot. iii. t. 211. f. F, G (1782).

Ucayali and Yurimaguas (*Bartlett*). Mus. D.
Valley of Cosnipata (*H. Whitely*). Mus. S. G.
"Very common about the banks of rivers."—*E. B.*

2. P. CUTORA, Gray, Cat. Lep. Ins. B. M. i. p. 58, t. 10*. f. 6 (1852).

Ucayali and Huallaga (*Bartlett*). Mus. S. G.

3. P. ERLACES, Gray, Cat. Lep. Ins. B. M. i. p. 49, t. 8. f. 9 (1852).

Pozzuzo (*Pearce*). Mus. S. G.

4. P. ÆNEAS, Linn. Mus. Ulr. p. 197 (1764).

Ucayali (*Bartlett*). Mus. S. G.

5. P. MADYES, Doubl. Ann. Nat. Hist. xviii. p. 375 (1846).

Huiro, ad alt. 4800 ped.; valley of Santana (*H. Whitely*). Mus. D.

One specimen only.

6. P. POLYDAMAS, Linn. Mus. Ulr. p. 192 (1764).

Upper Ucayali (*Bartlett*). Mus. S. G.
"Not common; found on the mud-banks of rivers."—*E. B.*

7. P. LYCIDAS, Cram. Pap. Exot. ii. t. 113. f. A (1779).

Huallaga (*Bartlett*). Mus. S. G.
Ucayali (*Bartlett*). Mus. D.
"Rare, about the banks of rivers and forest-streams."—*E. B.*

8. P. BELUS, Cram. Pap. Exot. ii. t. 112. f. A, B (1779).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.
Chamicuras (*Bartlett*). Mus. D.
"Plentiful about river-banks and villages."—*E. B.*

9. P. CRASSUS, Cram. Pap. Exot. ii. t. 112. f. C (1779).

Nauta, Ucayali, and Yurimaguas (*Bartlett*). Mus. D.
Valley of Cosnipata (*H. Whitely*). Mus. S. G.
"Very common about the banks of rivers."—*E. B.*

10. P. PAUSANIAS, Hew. Trans. Ent. Soc. ser. 2, ii. p. 22, t. 6. f. 2 (1852).

Chamicuras (*Bartlett*). Mus. D.
"Not common on the banks of forest-streams."—*E. B.*

11. P. DOLICAON, Cram. Pap. Exot. i. t. 17. f. C, D (1775).

Ucayali (*Bartlett*). Mus. S. G.

12. P. AUTOSILAUS, Bates, Trans. Ent. Soc. ser. 2, v. p. 348 (1861).

Ucayali (*Bartlett*). Mus. D.

13. P. TELESILAUS, Feld. Verh. zool.-bot. Ges. xiv. pp. 301, 345 (1864).

Ucayali (*Bartlett*). Mus. D.

14. P. ANDROGEOS, Cram. Pap. Exot. i. t. 16. f. C, D (1775).
Huasampilla, ad alt. 10,000 ped. (*H. Whitely*). Mus. D.

15. P. ANCHISIADES, Esp. Auss. Schmett. t. 13. f. 1, 2 (1785–1798).
Chamicuras and Yurimaguas (*Bartlett*). Mus. D.
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

16. P. ISIDORUS, Doubl. Ann. Nat. Hist. xviii. p. 374 (1846).
Pozzuzo (*Pearce*). Mus. S. G.

17. P. ZAGREUS, Doubl. Ann. Nat. Hist. xix. p. 174 (1847).
Pozzuzo (*Pearce*). Mus. S. G.

18. P. CTESIAS, Feld. Reise Nov. Lep. p. 86, t. 14. f. C, D (1865).
Pozzuzo (*Pearce*); valley of Cosnipata (*H. Whitely*). Mus. S. G.
Ucayali (*Bartlett*); Huasampilla (*H. Whitely*). Mus. D.

19. P. XANTHOPLEURA, Salv. & Godm. Ann. Nat. Hist. ser. 4, ii. p. 151 (1868).
Lower Huallaga (*Bartlett*). Mus. S. G.

20. P. WARSCEWICZII, Hopff. Stett. ent. Zeit. 1866, p. 29; Hew. Exot. Butt. iv. *Pap.* t. 10. f. 30 (1869).
Valley of Cosnipata (*H. Whitely*). Mus. D.

"Most of the Papilios may be found on the sand- and mud-banks of rivers, some more abundant than others. They congregate by hundreds on the decayed fruit and vegetable matter thrown about by the Indians, and retire to the forest at night, generally sitting on the underside of the leaves of trees."—*E. B.*

Family VI. HESPERIDÆ, Leach.

Genus THYMELE, Fab.

1. T. SIMPLICIUS, Stoll (*Pap. s.*) Supp. Cram. t. 39. f. 6, 6 E (1790).
Ucayali (*Bartlett*). Mus. D.

2. T. EURYCLES, Latr. (*Hesp. e.*) Enc. Méth. ix. p. 730. n. 5 (1823).
Ucayali (*Bartlett*). Mus. S. G. & D.

3. T. ORION, Cram. (*Pap. o.*) Pap. Exot. ii. t. 155. f. A, B (1779).
Peru (ex *Mus. Saund.*). Mus. D.

4. T. CATILLUS, Cram. (*Pap. c.*) Pap. Exot. iii. t. 260. f. F, G (1782).
Pozzuzo (*Pearce*). Mus. S. G.

5. T. PROTEUS, Linn. (*Pap. p.*) Mus. Ulr. p. 333 (1764).
Pozzuzo (*Pearce*). Mus. S. G.

6. T. EXADEUS, Cram. (*Pap. e.*) Pap. Exot. iii. t. 260. f. C (1782).
Ucayali (*Bartlett*). Mus. D.

Genus TELEGONUS, Hübn.

1. T. RAMUSIS, Cram. (*Pap. r.*) Pap. Exot. iv. t. 342. f. C (1782).
Pozzuzo (*Pearce*). Mus. S. G.

2. T. NAXOS, Hew. (*Eud. n.*) Descr. of Hesp. p. 10 (1867); Exot. Butt. v. *Eudamus*, t. 3. f. 19 (1875).
Ucayali (*Bartlett*). Mus. S. G.

3. T. LACYDUS, n. sp. (Plate XVIII. fig. 10.)

Upperside dark brown, paler on the outer margin of all the wings. Underside as above, the palpi and underside of the head orange.

Exp. 2 inches.

Ucayali (*Bartlett*). Type, Mus. S. G.

I have a specimen from Villa Nova, on the Amazons.

Genus THRACIDES, Hübn.

T. ARISTOTELES, Doubl. & Hew. Diurn. Lep. t. 80. f. 2 (1852).
Yurimaguas (*Bartlett*). Mus. D.

Genus ENTHEUS, Hübn.

E. PELEUS, Linn. (*Pap. p.*) Mus. Ulr. p. 327 (1764).
Ucayali (*Bartlett*). Mus. D.

Genus OXYNETRA, Feld.

O. SEMIHYALINA, Feld. Wien. ent. Mon. vi. p. 180 (1862); Reise Nov. Lep. iii. t. 70. f. 9 (1867).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

Genus PYRRHOPYGA, Hübn.

1. P. THASUS, Cram. (*Pap. t.*) Pap. Exot. iv. t. 380. f. M, N (1782).
Valley of Cosnipata (*H. Whitely*); Ucayali (*Bartlett*). Mus. D.

2. P. LEUCOLOMA, Ersch.
Pozzuzo (*Pearce*). Mus. S. G.

3. P. ACASTUS, Cram. (*Pap. a.*) Pap. Exot. i. t. 41. f. C, D (1776).
Ucayali and Yurimaguas (*Bartlett*). Mus. S. G. & D.

4. P. HADASSA, Hew. Trans. Ent. Soc. ser. 3, ii. p. 484 (1866).
Valley of Cosnipata (*H. Whitely*). Mus. D.

5. P. SCYLLA, Men. Cat. Mus. Pet. Lep. i. p. 95, t. 4. f. 7 (1855).
Pozzuzo (*Pearce*). Mus. S. G.

6. P. GNETUS, Fabr. (*Pap. g.*) Spec. Ins. ii. p. 135 (1781).
Yurimaguas (*Bartlett*). Mus. D.
Cosnipata valley (*H. Whitely*). Mus. S. G.

7. P PITYUSA, Hew. Exot. Butt. ii. *Pyr.* t. 2. f. 11 (1875).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

8. P. JAMINA, Butl. Trans. Ent. Soc. 1870, p. 499.
P. zimra, Hew. Exot. Butt. iv. *Pyr.* pl. ii. f. 11 (1871).
Nauta (*Bartlett*). Mus. D.

9. P. AZETA, Hew. Trans. Ent. Soc. ser. 3, ii. p. 479 (1866).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

Genus MYSCELUS, Hübn.

1. M. EPIMACHIA, Herr.-Schäff. Prod. Syst. Lep. iii. p. 59. n. 13 (1869).
Pozzuzo (*Pearce*). Mus. S. G.
Cosnipata valley (*H. Whitely*). Mus. D.

2. M. PHORONIS, Hew. (*Eryc. p.*) Descr. Hesp. p. 1 (1867).
Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

Genus ERYCIDES. Hübn.

1. E. PYGMALION, Cram. (*Pap. p.*) Pap. Exot. iii. t. 245. f. A, B (1782).
Pozzuzo (*Pearce*). Mus. S. G.
Chamicuras (*Bartlett*). Mus. D.

2. E. CORYTAS?, Cram. (*Pap. c.*) Pap. Exot. ii. t. 100. f. C (1779).
Nauta (*Bartlett*). Mus. D.

3. E. ORASUS, n. sp. (Plate XVIII. fig. 9.)

Upperside glossy black, with the fringe white; the palpi, head, neck, and anus dark red. Underside the same as *E. socrata*, but darker, with the basal half of the posterior wing white.

Exp. 1⅞ inch.
Valley of Cosnipata (*H. Whitely*), ex *Mus. Saunders*. Mus. D.

4. E. OREIDES, Hew. Exot. Butt. v. *Pyrrh.* & *Eryc.* f. 32, 35 (1875).
Pozzuzo (*Pearce*). Mus. S. G.

5. E. CHARONOTIS, Hew. Desc. Boliv. Butt. p. 21 (1874).
Valley of Cosnipata (*H. Whitely*). Mus. D.

Genus CARYSTUS, Hübn.

1. C. PSITTACINA, Feld. (*Hesp. p.*) Reise Nov. Lep. iii. p. 518, t. 71. f. 17, 18 (1867).
Valley of Cosnipata (*H. Whitely*). Mus. S. G.

2. C. SIMULIUS, n. sp. (Plate XVIII. fig. 8.)

Upperside dark brown; anterior wing crossed beyond the middle from the costal margin to the inner margin by a band of six small yellow spots; a yellow spot at the end of the cell; posterior wing crossed in the middle by a narrow band from the costal margin to near the anal angle. Underside brown; anterior wing with the base blackish, the spots as above, but larger, some of them running together; posterior wing crossed by a wide white band.

Exp. 1¾ inch.

Valley of Cosnipata (*H. Whitely*). Mus. D.

Allied to *C. xanthaphes*, Hübn., but very distinct.

Genus PYRGUS, Hübn.

1. P. OMRINA, Butl. Trans. Ent. Soc. 1870, p. 509.

Pozzuzo (*Pearce*). Mus. S. G.
Peru. Type, Mus. D.

2. P. THESTIA, Hew. (*Leucoch. t.*) Equat. Lep. p. 77 (1870).

Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

3. P. SYRECHTUS, Fab. (*Pap. s.*) Syst. Ent. p. 534 (1775).

Ucayali (*Bartlett*). Mus. D.

Geuus BRONTIADES, Hübn.

B. PROCAS, Cram. (*Pap. p.*) Pap. Exot. ii. t. 179. f. D (1779).

Ucayali (*Bartlett*). Mus. D.

Genus CARTEROCEPHALUS, Butl.

1. C. DIMIDIATUS, Feld. Reise Nov. Lep. iii. p. 522, t. 74. f. 7, 8 (1867).

Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

2. C. AGATHOCLES, Feld. *l. c.* f. 16, 17.

Pozzuzo (*Pearce*). Mus. S. G.

This species varies very much. A specimen in my collection is almost without the orange bands of the posterior wing.

Genus ACHYLODES, Hübn.

1. A. THRASO, Hübn. Samml. exot. Schmett. (1806–1816).

Pozzuzo (*Pearce*). Mus. S. G.

2. A. ——, sp. ?

Pozzuzo (*Pearce*). Mus. S. G.

3. A. BUSIRUS, Cram. (*Pap. b.*) Pap. Exot. iii. t. 261. f. A–C (1782).

Pozzuzo (*Pearce*). Mus. S. G.
Nauta (*Bartlett*). Mus. D.

4. A. CORBULO, Cram. (*Pap. c.*) Pap. Exot. iv. t. 354. f. A (1782).

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

5. A. OZOTES, Butl. Trans. Ent. Soc. 1870, p. 515.

Pozzuzo (*Pearce*). Mus. S. G.
Valley of Cosnipata (*H. Whitely*). Mus. D.

6. A. MELANDER, Cram. (*Pap. m.*) Pap. Exot. iii. t. 270. f. H (1782).

Valley of Cosnipata (*H. Whitely*). Mus. S. G. & D.

7. A. VIRIDICEPS, Butl. Cist. Ent. i. p. 115 (1872).

Pozzuzo (*Pearce*). Mus. S. G.

8. A. THRASYBULUS, Fab. (*Hesp. t.*) Ent. Syst. iii. 1. p. 346 (1793).

Ucayali (*Bartlett*). Mus. D.

9. A. NEARCHUS, Latr. (*Hesp. n.*) Humb. Bonp. Obs. Zool. ii. p. 135, t. 43. f. 3, 4 (1811–1823).

Ucayali and Yurimaguas (*Bartlett*). Mus. S. G. & D.

10. A. ——, sp.? *

Pozzuzo (*Pearce*). Mus. S. G.

11. A. PAUSUS, Doubl. & Hew. (*Achly. p.*) Gen. Diurn. Lep. t. 80. f. 6 (1852).

Nauta (*Bartlett*). Mus. D.

12. A. ——, sp.? *

Valley of Cosnipata (*H. Whitely*). Mus. S. G.

Genus HELIAS, Fabr.

H. ALBIPLAGA, Feld. Reise Nov. Lep. iii. p. 531, t. 73. f. 18, 19 (1867).

Huiro, valley of Santana (*H. Whitely*). Mus. D.

"I found the whole of the *Hesperidæ* plentiful throughout East Peru; they are found about the flowers in plantations and villages, as well as sand- and mud-banks of the rivers."—*E.B.*

EXPLANATION OF THE PLATES.

PLATE XVII.

Fig. 1. *Napeogenes pyrrho*, p. 209.
2. *Ceratinia tigrina*, p. 207.
3. *Melinæa chincha*, p. 211.
Fig. 4. *Ceratinia alexia*, p. 207.
5. *Mechanitis ortygia*, p. 208.
6 & 7. *Dædalma whitelyi*, p. 215.

PLATE XVIII.

Fig. 1. *Pedaliodes zoippus*, p. 214.
2. *Heliconius bartletti*, p. 219.
3. *Eresia pearcei*, p. 222.
4. —— *mundina*, p. 221.
5. —— *nussia*, p. 222.
Fig. 6. *Paphia alberta*, p. 234.
7. *Lycæna koā*, p. 239.
8. *Carystus simulius*, p. 248.
9. *Erycides orasus*, p. 248.
10. *Telegonus lacydus*, p. 247.

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* I cannot determine these species; they are simply brown on both sides.

6. On a small Collection of Butterflies from the New Hebrides. By Arthur G. Butler, F.L.S., F.Z.S., &c.

[Received January 12, 1876.]

The following species have recently been received from Alfred Corrie, Esq., Surgeon to H.M.S. 'Pearl.'

Family NYMPHALIDÆ.

Genus CALLIPLŒA, Butler.

1. CALLIPLŒA GRÆFFIANA, Herrich-Schäffer (two males).

Havannah Harbour, Vaté or Sandwich Island.

Dr. Herrich-Schäffer figures the female of this Butterfly, and remarks;—"Herr Hewitson erklärt sie für *E. hisme*, Boisd., welche identisch mit *E. eunice* sein soll."

The collection of the British Museum contains both *C. hisme* and *C. eunice*; they are quite distinct from one another and from *C. graeffiana*; the latter, indeed, occupies an intermediate position between *C. eunice* and *C. iphianassa*, from both of which it differs in the pale external area of the wings.

The male has a well-defined subcostal spot in primaries (as in *C. iphianassa*), and six well-defined discal spots, all white; a small oval lilac spot on interno-median area; secondaries with the usual whity brown subcostal patch; two obliquely placed subapical white spots, and four pale-brown discal spots. Expanse of wings 3 inches.

This species is new to the Museum collection.

Genus DANAIS, Latreille.

2. DANAIS MODERATA, Butler (two males).

Havannah Harbour, Vaté or Sandwich Island.

The two specimens sent by Mr. Corrie agree in every respect with the type, thus establishing its constancy.

Genus DOLESCHALLIA, Felder.

3. DOLESCHALLIA MONTROUZIERI, Butler (two males).

Espirito Santo, Havannah Harbour, Vaté or Sandwich Island.

Rather larger than the type, but in other respects similar.

Genus JUNONIA, Hübner.

4. JUNONIA VILLIDA, Fabricius (one female).

Havannah Harbour, Vaté or Sandwich Island.

Genus DIADEMA, Boisduval.

5. DIADEMA NERINA, Fabricius (four males and two females).

Havannah Harbour, Vaté or Sandwich Island.

This species has hitherto been known only from Australia, Woodlark Island, and Java. One of Mr. Corrie's females is a curious variety, in which the tawny spot of primaries above is barely visible, and the submarginal whitish spots are obsolete.

The specimens were taken on the 7th of July, 1875; they are much worn, which indicates that they must have been some time on the wing.

6. DIADEMA OCTOCULA, Butler (one male and two females).

Havannah Harbour, Sandwich Island (22nd July, 1875).

This species has hitherto been unique in Mr. Druce's collection from Totoya, Fiji; the male from Vaté differs slightly from my figure in the outline of the tawny band of primaries.

Hitherto I have considered the *D. formosa* of Herrich-Schäffer to be the male of my *D. octocula*; but now that we have both sexes I am compelled to admit that Mr. Wallace was correct in determining the type to be a male in which the abdomen is greatly distended; *D. formosa* is a distinct species.

The female of *D. octocula* differs from the male in its superior size, the much paler colour of the tawny bands; the primaries with better-defined papillated ocellus; four or five subapical white spots; secondaries with white pupils to all the black spots.

Family LYCÆNIDÆ.

Genus LAMPIDES, Hübner.

7. LAMPIDES TAITENSIS, Boisduval (one female).

Espirito Santo, New Hebrides (6th August, 1875).

The arrival of this little species is interesting; I had supposed *L. taitensis* to be the *L. platissa* of Herrich-Schäffer; but as Boisduval says, at the end of his description, "Il est de la taille de *Catochrysops bæticus*" (which suits this species admirably, whilst *L. platissa* more nearly resembles *L. strabo*), I have very little doubt that we now actually possess the typical *L. taitensis* of the 'Astrolabe.'

8. LAMPIDES CANDRENA, Herrich-Schäffer (one female).

Montague Island.

It is impossible to decide, without seeing plenty of specimens of both sexes, whether or not the females of this species vary in the width of the brown outer border; in the specimen here registered, and one previously received from Fiji, the border is nearly twice as wide as in an example sent to us from Germany with Herrich-Schäffer's name attached to it, yet in the males I find no such difference.

9. LAMPIDES GOODENOVII, n. sp.

♀. Allied to the preceding, but brilliant greenish *morpho*-blue, the outer borders black, sharply defined; the under surface altogether deeper in colour, reddish brown, crossed by the same whitish lines; ocelli with reddish-orange zones. Expanse of wings 1 inch 2 lines.

Espirito Santo, New Hebrides (6th August, 1875).

This species is more brilliantly coloured than any other Butterfly in the genus; I have named it in honour of the universally beloved and much lamented Commodore Goodenough, who met his death whilst out with Messrs. Perry and Corrie on an entomological excursion.

Family PAPILIONIDÆ.

Genus BELENOIS, Hübner.

10. BELENOIS NISEIA, McLeay (one male).

Havannah Harbour, Vaté or Sandwich Island.

The single example sent differs a little from the Australian type, inasmuch as it resembles *B. clytie* ♂ on the upperside; but, without seeing more specimens, it would be unsafe to consider it a distinct species.

7. Descriptions of new Birds obtained by Mr. C. Buckley in Bolivia. By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN, M.A., F.R.S.

[Received January 14, 1876.]

A collection of bird-skins formed by Mr. C. Buckley during his recent expedition into Bolivia, at several localities on the eastern slope of the main chain of the Andes, contains about 250 specimens, referable to 133 species. As a second collection is shortly expected from Mr. Buckley, we reserve a full account of the first one until the series is complete, and for the present only give descriptions of the new species which it contains. These are:—

1. DIGLOSSA GLAUCA, sp. nov.

Ex cinereo cærulescens fere unicolor; alis caudaque nigris cæruleo limbatis: subtus obscurior, remigum marginibus internis cinereis: rostro corneo, mandibula inferiore ad basin alba, pedibus nigris: long. tota 4·0, *alæ* 2·3, *caudæ* 1·6.

Hab. Nairapi, Bolivia (*Buckley*).

Mus. S.-G.

Of this new *Diglossa* Mr. Buckley sends but one specimen. It is a small species belonging to the "homochroous" section of Sclater's arrangement (Ibis, 1875, p. 207), and may be best placed between *D. plumbea* and *D. personata*. From the latter it is distinguishable by its much inferior size, from the former by its colour.

2. BUARREMON MELANOPS, sp. nov.

Buarremon rufinucha, Sclater, Cat. A. B. p. 91 (nec Lafr. et D'Orb.).

Supra niger; pileo cum nucha castaneo; lateribus capitis et mento summo nigris: subtus flavus, hypochrondriis et crisso in olivaceum transeuntibus: rostro nigro, pedibus obscure corneis: long. tota 6·0, *alæ* 2·7, *caudæ* 2·6.

Hab. Simacu, Bolivia (*Buckley*).

Mus. S.-G. et P. L. S.

Obs. *B. rufinucha* (Lafr. et D'Orb.) * macula frontali utrinque sulphurea sane species diversa est.

Sclater has long had two examples of this species in his collection obtained from the Maison Verreaux. They were referred to *B. rufinucha* erroneously, as it appears on examination of the specimens of that species in the British Museum. Mr. Buckley sends us five examples of this bird, all obtained at Simacu.

3. LEPTOPOGON TRISTIS, sp. nov.

Supra olivaceus, unicolor; alis nigris, tectricum alarium et secundariorum externorum apicibus macula quadrata sulphureo-alba ornatis; remigum et rectricum marginibus externis olivaceis: subtus sulphureo-flavus: subalaribus flavis: rostro et pedibus nigris: long. tota 4·4, *alæ* 2·15, *caudæ* 2·0, *tarsi* 0·75.

Hab. Bolivia, Simacu (*Buckley*).

Mus. S.-G. et P. L. S.

Obs. Sp. corporis colore supra olivaceo, subtus omnino flavo, ab aliis hujusce generis satis definita.

Sclater has long had a single worn and imperfect skin of this *Leptopogon* in his collection under the MS. name which we now publish. Mr. Buckley sends but a single specimen. Sclater's example was obtained from a dealer in Paris, without any locality attached to it.

4. HYPOXANTHUS ATRICEPS, sp. nov.

Hypoxanthus rivolii, Scl. et Salv. P. Z. S. 1873, p. 780.

Hab. Peruvia alta, Husampilla (*Whitely*); Bolivia, Ramosani (*Buckley*).

Mus. S.-G.

Obs. Similis *H. rivolii*, sed pileo summo in mari nigerrimo nec rubro.

An examination of a series of skins of this Woodpecker from Columbia, Ecuador, Peru, and Bolivia seems to show the form from the two latter countries is distinct—the head in the male being black, and never acquiring the brilliant crimson of the northern form.

February 15, 1876.

Prof. Mivart, F.R.S., in the Chair.

The following report on the additions to the Society's Menagerie during the month of January 1876 was read by the Secretary:—

The total number of registered additions to the Society's Menagerie during the month of January 1876 was 52, of which 32 were by presentation, 10 by purchase, and 10 were received on deposit. The total number of departures during the same period by death and removals was 78.

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* *Vide* Sclater, Syn. Av. Tanagr. p. 25.

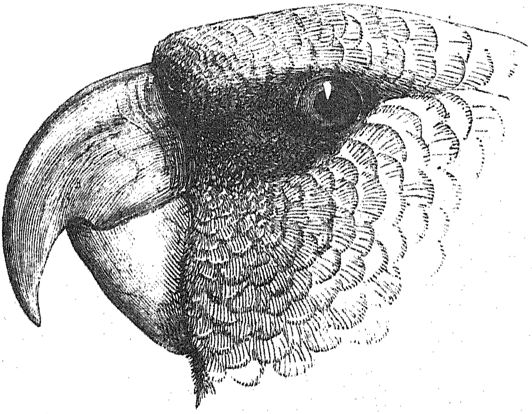
The most noticeable additions during the month were:—

1. A Levaillant's Cynictis (*Cynictis penicillata*), presented by Viscount Mandeville, January 5th. Of this rare and elegantly shaped Carnivore (figured in the Society'e 'Transactions,' vol. i. pl. iii.) but few specimens have been lately received. One previously obtained was accidentally omitted from the Revised List of Vertebrates, where the species is not mentioned.

2. A White-spotted Crake (*Porzana notata*), captured at sea off Cape Santa Maria, Uruguay, by an officer of the R.M.S.S. 'Elbe,' and received January 19th. The specimen agrees accurately with the figure in the 'Zoology of the Voyage of the Beagle' (Birds, pl. 48). The species is rare, and quite new to the collection.

3. A Panda (*Ælurus fulgens*), sent home from Calcutta, and purchased 16th February, 1876. There has been but one living specimen of this rare animal previously in the collection.

Mr. Sclater exhibited the Parrot designated in Tschudi's 'Fauna Peruana' (Aves, p. 271) *Conurus illigeri*, which had been kindly sent to him for examination by M. Louis Coulon, Honorary Director of the Museum of Neuchâtel, and observed that it had been wrongly determined by the author of the 'Fauna Peruana.' The specimen, which, in spite of what Tschudi said, was certainly not far from mature, presented no traces of the red markings on the front, back, and belly, which are characteristic of *Ara maracana* (i. e. *Conurus illigeri* of Tschudi), and had besides a larger and deeper bill and longer tail. It appeared to belong to a species hitherto unrecognized, which might be described as follows:—



Head of *Ara couloni* (nat. size).

Ara couloni, sp. nov.

Conurus illigeri, Tsch. Fauna Per. Aves, p. 271.

Sittace maracana, part, Finsch, Papag. i. p. 420.

Diagn. *Viridis, capite undique remigibus et rectricibus extus cæru-*

lescentibus: caudæ parte basali in rectricibus externis rubricante: alarum et caudæ pagina inferiore flavicante: long. tota 16·0, *alæ* 8·7, *caudæ rectr. med.* 9·5, *lat.* 4·5.

Hab. Peruvia alta, in reg. sylvatica orientali, ab incolis *Loro real* dicta (*Tschudi*).

Mus. Novo-Castellano.

Obs. Species ab *Ara maracana* rostro majore, genis solum nudis, area postoculari plumosa, et corporis colore rubro nullo certissimè diversa, et Ludovico Coulon, Musei Novo-Castellani Directori optimo, dicata.

Dr. T. S. Cobbold, F.R.S., exhibited and made remarks on a Parasite (*Echinorhynchus*) obtained from the Tamandua Ant-eater which had died in the Society's Menagerie, and had been described in his communication made at the last meeting.

Mr. W. K. Parker read the second part of his memoir on Ægithognathous Birds [*], of which the following is an abstract:—

In my former communication I described thirty-one examples of this kind of palatal structure in birds; in the present paper I have added fifty-one more.

Altogether these eighty-two birds belong to thirty-nine "families;" so that I have taken, on an average, two examples of each family. The materials for this research have been kindly and liberally put into my hands by a number of friends, among whom I may mention Professors Alfred Newton, T. Rupert Jones, and Garrod, Dr. Murie, Osbert Salvin, Esq., Robert Swinhoe, Esq., Mr. W. J. Williams, and Mr. Bartlett.

I began my last paper with a bird showing "Ægithognathism" in its initial state. I end this communication with another instance: the first was *Turnix*, this is *Thinocorus*—both of the utmost importance to any one seeking for the true passerine *phylum*.

Now if any one will say that because I have found initial Ægithognathism in birds so far down below the most degraded (or rather *non-elevated*) type of Passerines, as these birds, that therefore I, putting these types in the Ægithognathous list, seek to make them appear as "Coracomorphæ," such a one has failed to catch my drift. Do we modern biologists believe in the gradual modification of types or evolution of species, or do we not? If we do, we shall reasonably expect to find that our neatly trimmed and highly special types must have had grosser and more general ancestors in the Tertiary period. Allowing this supposition, and looking upon birds as a hot-blooded group whose *root* lay low down, once, among the cold blooded reptiles, shall we not expect to find birds more or less related to the modern types having the nature of several at once?—"all these in their pregnant causes mixed."

In the examples given in this second part I have shown peculiarities of the skull that belong to certain groups of families, which will, when once understood, be very helpful to Taxonomists. These more minute researches go to modify some of Professor Huxley's views, as expressed in his paper 'On the Classification of Birds' (P. Z. S. 1867, p. 415). Certain it is that the skull of a bird often seems to harmonize very ill with the rest of its structure, even with the rest of the skeleton. Still the morphology of this chief part of the framework, modified as it is in relation to the nervous, digestive, and respiratory systems, must be of the utmost importance to any one seeking to have broad views on these subjects.

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[*] For part I. see Trans. Zool. Soc. ix. p. 289.

"The groups formed by cranio-facial characters have a variable value; the desmognathous face passes over the Struthious border and is possessed by the gallo-struthious Tinamous. The saurognathous face (see Trans. Linn. Soc. 1875, plates i.–v.) is possessed by the "Celeomorphæ" only—namely, by the Woodpeckers and Wrynecks.

"The ægithognathous face is possessed by all the 'Coracomorphæ,' and by them only, *in a perfect form*, with the single exception of the Swifts (Cypselidæ)—a mere big 'genus' capable of being cut up into a few subgenera.

"The desmognathous face turns up in many places; its fundamental or embryonic form is the schizognathous, the simple reptilian cleft palate; this becomes desmognathous by ankylosis of the right and left elements of the palate. Desmognathism is seen in the Ægithognathæ when ossification is very intense, as in *Artamus*, *Paradisea*, and *Gymnorhina*.

"The simple, open, or cleft palate generally occurs in the groups that lie on a level two or three degrees above the Ratitæ, as Rails, Plovers, Cranes, and the Fowl tribe; but it is also retained in types that in other respects are amongst the highest and most specialized, as the Trochilidæ and the Caprimulgidæ.

"In the present paper research has been made into the morphology of the skull in the following groups—namely Tanagridæ, Brachypodidæ, Phytotomidæ, Meliphagidæ, Mniotiltidæ, Cœrebidæ, Vireonidæ, *Cardinalis*, Icteridæ, Emberizidæ, Fringillidæ, Alaudidæ, Paridæ, Panuridæ, Cypselidæ, Hirundinidæ, Oriolidæ, Motacillidæ, Muscicapidæ, Liotrichidæ, *Saxicola*, and Nectariniidæ.

"And, lastly, the remarkable skull of *Thinocorus* is described, a small Chilian type, whose body is thoroughly Charadrian, but whose head is a mysterious mixture. Being imperfectly ægithognathous, it is here compared with the completely ægithognathous Passerine types on the one hand, and on the other with birds much nearer akin, namely the Crane and the Sun-bittern. These latter, in an appendix, serve to compare with *Thinocorus*, and also show the schizognathous palate for comparison with the more complex palate of a Passerine bird.

"*Thinocorus*, whilst essentially a Plover, if the characters of the skeleton generally be considered, yet shows more likeness in its skull to that variety of the Plover type which we see in the larger Cranes.

"The Tinamous, largely specialized into a kind of low gallinaceous *carinate* type, yet retain the same form of skull and face as the Ratitæ. *Thinocorus* also retains much that is dromæognathous in its skull, mixed with normal schizognathism: but superadded to these characters we find an intimate union of the broad vomer with the largely developed alinasal floor; a little more metamorphosis, and the palate would have corresponded with that of the Passerine birds.

"But in this bird, as in the Hemipod (*Turnix*) it is not in the structure of the vomer and its relation to the nasal labyrinth that we find all the Passerine characters. The face, generally, is rich in such modifications: I showed them in my former Part with regard to *Turnix*, and in this in the genus *Thinocorus*.

"In the marvellously specialized skulls of the Passerinæ unlooked-for osseous centres often appear; these are often very uniform in certain families which are more or less allied.

"The first I may mention here are the "palato-maxillaries;" these are a pair of bones, separately representing the ingrowth of our upper jaw-bone which forms the "hard palate." I find these in the following families, namely Tanagridæ, Brachypodidæ, Mniotiltidæ, Cœrebidæ, Cardinalidæ, Icteridæ, and Emberizidæ. In some families, besides lesser ossicles added to the vomer, one on each shoulder, the vomer is not merely composed of a right and left half, but each moiety is more or less broken up into two centres. Here we have repeated the tetramerous vomer (vomers and 'septo-maxillaries') of the Snake and the Lizard. The families showing this structure more or less clearly are the Mniotiltidæ, Cœrebidæ, Vireonidæ, Muscicapidæ, and Saxicolidæ.

"With the exception of *Menura*, the South-American types are most generalized, low, and, I may say, ancient; next to them the Australian birds, and those from Malaisia and Central America; whilst the most highly specialized types belong to the northern hemisphere generally.

"Looked at from my particular morphological stand-point, facts like these seem to me to be well worth the pleasant labour I have spent in obtaining them."

This paper will be published entire in the Society's 'Transactions.'

The following papers were read:—

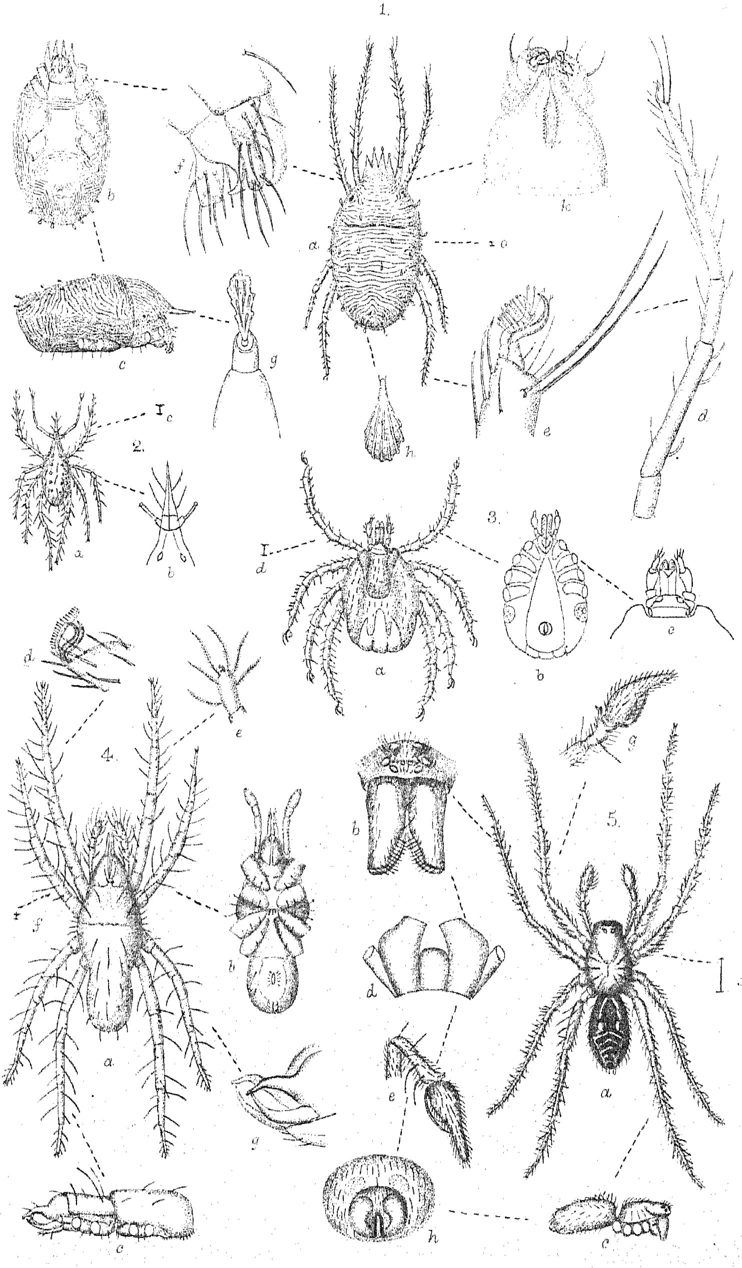
1. On a new Order and some new Genera of Arachnida from Kerguelen's Land. By the Rev. O. P. CAMBRIDGE, M.A., C.M.Z.S., Hon. Memb. New-Zealand Institute.

[Received January 15, 1876.]

(Plate XIX.)

The few examples of Arachnida found during the late Transit-of-Venus Expedition to Kerguelen's Land, and kindly sent to me by the Rev. A. E. Eaton, I propose now to describe and figure. Almost

P. Z. S. 1876. Pl. XIX.



O. P. Cambridge del^t. A. T. Hollick lith.
W. West & C^o. imp.

Kerguelen Island. Arachnida.

all of them are remarkable; all appear to be new to science; and one, indeed, at present seems to me incapable of inclusion in any hitherto recognized order of Arachnids. The whole collection consisted but of five species; one of Araneidea and three of Acaridea, the fifth being that upon which I propose to found a new genus, family, and order. At first sight this delicate little Arachnid gave me the idea of a Chelifer deprived of its forcipated palpi; but a subsequent examination with a stronger lens showed me that it possessed palpi of an entirely different character from those of the pseudo-Scorpiones; and a final scrutiny under a still higher power led to the detection of the eyes: in the number and position of these there is a remarkable similarity to the Solpugidea, while there are not wanting some general indications of affinity to the Araneidea. Its small size and general appearance when alive would probably induce one to place it among the Acaridea; but the structure of the mouth-parts, the distinct cephalothorax and abdomen, and especially the character of the eyes seemed to preclude this allocation. It is possible, however, that when the Acaridea have been more thoroughly worked out by some future arachnologist, the present anomalous little creature may become the type of a suborder, or perhaps only of a family of that order. Meanwhile in forming a distinct order for its reception, I desire to obtain the free criticism and opinion of arachnologists more conversant than myself with some obscure groups of Acaridea, as to its true systematic position.

Order ACARIDEA.

Fam. ACARIDES.

Gen. nov. TORYNOPHORA.

Body oval; a slightly indented transverse line towards the fore part on the upperside appears to mark the junction of the cephalothorax and abdomen.

Mouth-parts almost soldered together, leaving only the short palpi and the extremities of the falces traceable.

Legs 8, slender, in 4 pairs (1–2 and 3–4 on each side), 5-jointed, and terminating with two somewhat S-curved claws springing from a small supernumerary or heel-joint.

Eyes four, in two pairs, one pair on either side of the caput.

Falces armed on the underside with serrated opposed edges.

Palpi short, strong, 4-jointed, with a single strong curved jaw-like claw springing from its base on the upperside.

TORYNOPHORA SERRATA, sp. n. (Plate XIX. fig. 1.)

Length ¼ line.

This minute Acarid is of an oval form, tolerably convex above, and of a uniform pale luteous colour. From the fore part of the cephalothorax four pointed processes project, each one terminating with a very small joint, from which springs a curious clavate or spoon-shaped bristle or tag; a few with a somewhat similar tag are dispersed thinly over the upper surface of the body, which is closely wrinkled, the wrinkles taking different but regular directions on the different parts of the body.

The *eyes* are very minute, in two pairs, one on either side of the caput; those of each pair are near together but not contiguous.

The *legs* are 5-jointed, slender, and not very long; they are armed with fine spines, bristles, and hairs, and terminate with two tarsal S-shaped claws, springing from a small terminal joint, and furnished beneath with some slender prominent clavate hairs. The legs are in pairs, the first and second, and third and fourth legs on each side having their basal joints respectively contiguous to each other, as in the genus *Trombidium*, and articulated to the fore half of the lower surface of the body.

The *palpi* are short, strong, 4-jointed; and to the upperside of the base of the digital joint is articulated a strong curved claw.

The *maxillæ, labium*, and *falces* coalesce and form a kind of suctorial apparatus, towards the fore part of which on the underside are two opposed curved saw-edged processes.

Several examples of this curious Acarid, found under stones, were contained in the Rev. A. E. Eaton's Kerguelen's-Land collection. Being so very minute and delicate, they had suffered considerably by being preserved in strong spirit.

Fam. BDELLIDES.

Gen. SCIRUS, C. Koch?

SCIRUS PALLIDUS, sp. n. (Plate XIX. fig. 2.)

Length $\frac{1}{2}$ a line.

As far as I could ascertain from the single example contained in the Kerguelen-Island collection, this small Acarid is an undescribed species of the genus *Scirus*. Its colour is a dull yellowish white; and there are a few obscure blackish markings in two parallel longitudinal lines along the upperside of the abdomen. The body and legs are furnished with a few longish pale semidiaphanous hairs. The *eyes* are in two pairs, those of each pair contiguous, and in the position indicated by the two small oval markings in figure 2 *b*. The only example received was injured by the action of the spirit in which it had been preserved, so that the exact details of its structure could not be satisfactorily observed; in the general appearance, however, of the beak-like mouth-parts there seemed to be but little difference from the genus *Bdella* and others nearly allied.

Order ACARIDEA.

Fam. IXODIDES.

Gen. HYALOMMA, C. Koch.

HYALOMMA PUTA. (Plate XIX. fig. 3.)

Length $\frac{2}{3}$ line.

Body oval. *Cephalothorax* yellowish brown, strongly tinged with red on either side of its fore part and on the fore part of the caput.

Abdomen dark yellow-brown, and (as well as the cephalothorax) thinly clothed with short pale hairs; the hinder part of the abdomen is of a pale dull yellowish hue, and its margin is indented with four small elongate notches. On each side of the underpart, just behind the basal joints of the 4th pair of legs, is a roundish patch, whose surface appears to be covered with minute points, which may possibly be the plates of spiracular organs.

The *legs* are moderately long and tolerably strong, 7-jointed, the last or tarsal joint being very small; they are of a pale yellowish colour, marked underneath with patches of a bright shining orange red, and furnished with a few short hairs; each tarsus terminates with two curved diaphanous claws springing from a small claw-joint; and beneath them is an oval sucker-like pad.

The *palpi* are five-jointed (including the basal joints or maxillæ); these latter are of a reddish colour and soldered to the labium; the colour of the palpi is similar to that of the legs; the terminal (or digital) joint is short and small; the next to it (or radial) is large and tumid, the other two joints short. The length of the palpi slightly exceeds that of the falces.

The *falces* are porrected in the form of a beak, and are armed beneath with numerous sharp hooks or teeth directed backwards.

Several examples of this Acarid were found by the Rev. A. E. Eaton on a Penguin (*Pygosceles tæniatus*) in Kerguelen's Land.

Ordo nov.? PŒCILOPHYSIDEA.

External Characters of the Order:—*Cephalothorax* and *abdomen* covered with a continuous epidermis of a rather slight texture, unsegmented, and united to each other throughout their whole breadth, the point of junction being clearly indicated by a transverse line or suture. *Palpi* filiform, and terminating with a single minute claw. *Legs* eight in number, their basal joints closely grouped together on the sternal surface of the cephalothorax, the tarsi terminate with two claws, between which is a slender pectinated style. *Falces* didactylous. *Maxillæ* coalescing at their base. *Labium* (properly so called) wanting. *Eyes* two.

Fam. PŒCILOPHYSIDES.

In its *general appearance* this curious little Arachnid seems to be a compound of the Spiders, Solpugids, Chelifers, and Acari. On its upperside it reminds one strongly of the Solpugidea, both in the massive falces, and its two eyes on a small tubercle at the fore extremity of the caput; its underside bears a strong resemblance in the maxillæ and palpi to the Araneidea; its profile resembles that of the pseudo-Scorpiones, while in its small size, continuous, delicate epidermis, and closely approximated thorax and abdomen it shows a strong likeness to the Acaridea.

Gen. nov. PŒCILOPHYSIS.

Eyes two, closely grouped on a small tubercle at the fore extremity of the caput, just between and above the base of the falces.

Falces massive, as long as the cephalothorax, two-clawed, the upper claw fixed, the lower movable, and both curved.

Maxillæ large, coalescing at their base, and produced at their inner extremity into a strong angularly pointed projection.

Labium none, and *sternum* none, properly so called, the basal joints of the legs being articulated to the inferior surface of the cephalothorax.

Abdomen longer than the cephalothorax. A small elongate oval aperture towards the hinder part of the underside is probably the genital opening, while a still more minute orifice beneath its extremity is probably the anal aperture.

Legs moderately long and tolerably strong; they are 6-jointed, furnished with long bristles, and terminating in two S-curved claws, beneath which is a longish, slender, slightly upturned style, plumose or finely pectinated along its underside.

Palpi 4-jointed, similar to the legs in armature; the terminal (or digital) joint ends with a small hooked claw; and the bristles or hairs on it are long and plumose.

PŒCILOPHYSIS KERGUELENENSIS, sp. n. (Plate XIX. fig. 4.)

Adult female. Length $\frac{1}{3}$ line.

The *cephalothorax* is of a somewhat quadrate form, narrower before than at its junction with the abdomen; it is moderately convex above, and has a few long pale hairs or slender bristles directed forwards on its upperside: its profile line is nearly level; and the colour of the cephalothorax and abdomen is pale yellow, the legs and other parts being of a whitish hue.

The *eyes* are small, but close together near the hinder part of a small roundish tubercle or eminence, at the middle of the fore extremity of the caput.

The *legs* are 6-jointed, rather long, tolerably strong, not greatly differing in length, their relative length being 1, 4, 2, 3; they are furnished with long pale bristles; and the tarsi, which are undivided and with two claws, are curved somewhat in the form of an S: beneath them is a largish bristle or style, pectinated or plumose on its inferior side. The joints do not differ greatly in length, the first two or basal ones being the longest, and the rest nearly equal.

The *palpi* are similar, in their general armature, to the legs. The digital joint is longer than the radial, and of an ovoid form; its hairs are plumose, and the single terminal claw is sharply hooked and minute.

The *falces* are as long as the cephalothorax, very massive at the base and didactyle, the lower claw being movable and opposed to the upper one; both claws are curved, but project in the same straight line and in the same plane as the cephalothorax, which the falces equal in length.

The *maxillæ* are long, their inner extremities considerably produced into an angularly pointed form, and extending close beneath the falces, to about two thirds of their length.

The *abdomen*, looked at in profile, is higher and more convex than the cephalothorax, and about double its length; its fore extremity is conterminous in its breadth with the cephalothorax, but is constricted laterally near the middle, the hinder extremity being rounded and obtuse; its upper surface is furnished with a few long pale hairs or bristles.

Several examples of this minute but most interesting Arachnid were found under stones in Kerguelen's Land by Mr. Eaton. Unfortunately, from their extreme delicacy and small size, they had suffered severely from the action of the strong spirit in which they were immersed.

Order ARANEIDEA.

Fam. AGELENIDES.

Gen. nov. MYRO.

Cephalothorax oval, roundly truncated before, and moderately constricted on its lateral margins at the caput. Upper convexity moderate; profile-line slopes very gradually in a slightly curved line from the hinder slope to the ocular region; clypeus unusually narrow, almost obsolete. Spinners short, those of the inferior pair longest and strongest.

Eyes eight, unequal in size and forming a rather large and somewhat oval area, enclosed by two longitudinal curved rows of three eyes each; the curves directed from each other; within this area, and towards its fore part, are two minute eyes near together in a transverse line.

Legs not greatly different in relative length, which is 4, 1, 2, 3. Each tarsus terminates with three claws.

Maxillæ large, curved towards the labium, much and roundly protuberant on the outer sides towards their extremity, which is rather obliquely truncated; the palpi issue from unusually near their lower extremities.

Labium rather more than half the length of the maxillæ, very difficult to be seen clearly; but its form is apparently oblong, slightly rounded at the apex.

MYRO KERGUELENENSIS, sp. n. (Plate XIX. fig. 5.)

Adult male. Length nearly 2½ lines.

The *cephalothorax* is of a yellow brown colour, the margins surrounded with a fine black line; the normal grooves and indentations are well marked, and suffused with dusky black, giving the thorax somewhat the appearance of radiating markings; the ocular region is furnished with some bristly black hairs; and some longer and finer ones are distributed along the central longitudinal line to the hinder slope.

The *eyes* are unequal in size and form a largish hexagonal area on the fore part of the caput close to its fore margin; they may be described either as in two longitudinal curved rows of three eyes each, with two minute ones in a transverse line towards the fore extremity of the enclosed area, or as four pairs, a hinder pair, two fore lateral pairs, and a fore central pair; those of the hinder pair are separated by an interval of an eye's diameter, and each is also divided by an equal interval from the hinder eye of the lateral pair on its side; the eyes of each lateral pair are separated by a slight interval, not exceeding half the diameter of one of the fore central eyes; the hind laterals are the largest of the eight; and the interval between the fore laterals is equal to about $1\frac{1}{2}$ diameter; the interval between the eyes of the fore central pair is equal to a diameter, the distance of each from the fore lateral on its side being rather greater; and that of each from the hind lateral is equal to the diameter of the latter; the interval between the fore lateral eyes and the fore margin of the caput is very slight indeed, being less than the diameter of one of the central eyes.

The *legs* are moderately long and strong; their relative length does not differ greatly, being 4, 1, 2, 3. They are of a brownish yellow colour, faintly and imperfectly annulated with dusky brown; the annulations are scarcely perceptible in some examples. They are furnished with spines, bristles, and hairs, some of the latter being at right angles to the different joints; each tarsus terminates with three curved claws, of which the inferior is much the smallest, and sharply bent downwards.

The *palpi* are similar in colour to the legs; furnished with hairs and a few bristles, and of moderate length and strength. The cubital joint is short and bent; the radial is slightly longer and spreads out gradually on its outer side into a somewhat irregularly shaped prominent but not very large apophysis at its fore extremity; the digital joint is long and rather narrow, similar in form to that of some species of *Tegenaria*; the palpal organs are simple, and have a long curved filiform spine connected with them, and by which they are very nearly encircled; this spine issues from the base of the palpal organs, and curving first round their inner margin terminates on the opposite side.

The *falces* are long, strong, and vertical, prominent near their base in front, and similar in colour to the cephalothorax.

The *maxillæ* are similar in colour to the falces; their form has been already described above.

The *labium* has also been described. Its colour is dark blackish brown.

The *sternum* is heart-shaped, similar in colour to the legs, and furnished with hairs.

The *abdomen* is oval, moderately convex above, and does not project greatly over the base of the cephalothorax. It is clothed with hairs, some on the fore part of the upperside being prominent and of a bristly nature. Its colour is brownish yellow mixed with brown and black, a tolerably distinct pattern being visible on the upperside; that on the fore half consists of two longitudinal curved rows, each of three irregular yellowish spots, followed (on the hinder half) by a series of alternate yellowish and black angular bars or chevrons, the angles directed forwards; or the hinder half may be described as of a yellowish colour marked with a series of four or six black angular bars, which diminish in size towards the spinners; the underside of the abdomen is of a uniform blackish brown colour with an indistinct pale longitudinal line on either side.

The spinners of the inferior pair are strong but short, though longer than those of the superior pair.

The *female* resembles the male in general colour and markings; the sides of the abdomen, however, on the hinder half are paler than those of the male, and are marked with two differently sized oblique irregular blackish markings; the genital aperture is simple, but of a distinctive form.

Eight males and one female were received from the Rev. A. E. Eaton, by whom they were found on Kerguelen's Land under stones, and running also at times on the ground.

This spider (as above observed), the only one found on the island, is of great interest, being unmistakably allied to *Tegenaria* and *Agelena*, though quite distinct from both.

EXPLANATION OF PLATE XIX.

Fig. 1. *Torynophora serrata*, sp. n.
a, upperside, highly magnified; *b*, underside without the legs; *c*, profile; *d*, leg of first pair; *e*, extremity of tarsus of ditto: *f*, palpi; *g*, extremity of one of the cephalic projections, highly magnified; *h*, one of the clavate hairs on abdomen, highly magnified; *k*, mouth-parts on underside, highly magnified; *o*, natural length.

Fig. 2. *Scirus pallidus*, sp. n.
a, upperside; *b*, upperside of caput and mouth-parts, more enlarged, showing the position of the eyes; *c*, natural length.

Fig. 3. *Hyalomma puta*, sp. n.
a, upperside; *b*, underside without legs; *c*, caput, palpi, and falces, more enlarged; *d*, natural length.

Fig. 4. *Pœcilophysis kerguelenensis*, sp. n.
a, upperside; *b*, underside without legs; *c*, profile without legs or palpi; *d*, extremity of tarsus of leg of second pair; *e*, digital joint of palpus; *g*, portion of falces and maxillæ in profile; *f*, natural length.

Fig. 5. *Myro kerguelenensis*, sp. n.
a, upperside; *b*, fore part of caput and falces, from the front, showing the position of the eyes; *c*, profile; *d*, maxillæ and labium; *e*, *g*, left palpus in two positions; *h*, genital aperture (♀); *f*, natural length.

2. Descriptions of Four new Species of Helix; with some notes on *Helix angasiana* of Pfeiffer. By GEORGE FRENCH ANGAS, F.L.S., C.M.Z.S.

[Received January 26, 1876.]

(Plate XX.)

HELIX BEATRIX, n. sp. (Plate XX. figs. 1 to 5.)

Shell narrowly perforate, ovately conical, rather thin, not shining, finely obliquely striated, variously coloured; spire conoidal; whorls 6½, rounded, narrowly margined at the sutures, the last non-descending, somewhat inflated and obtusely subangulated at the periphery in front, moderately convex at the base; aperture subcircular; the outer lip very slightly expanded and reflected; the collumella descending vertically and callously reflected over the perforation.

Diam. maj. 10, min. 8, alt. 13 lines.

Hab. ? Solomon archipelago.

Var. *a.* Rich orange-yellow throughout, inner lip white, apex sometimes of a carnelian color.

Var. *b.* Bright yellow, apex orange, with a narrow black band immediately below the suture of the last whorl, lip black.

Var. *c.* Pellucid white, upper whorls yellow or orange.

Var. *d.* Upper whorls white, last whorl light brown, with a narrow pale band below the suture, lip white stained inside with purple.

Var. *e.* Very dark purplish chocolate-colour, reddish towards the apex.

This shell, like *Helix meta*, Pfr., is subject to remarkable variations in colour, but may at once be distinguished by its smaller size, the convexity of the whorls, and the roundness of the aperture, in which the subflexuous outer lip and diagonal form of *H. meta* are wanting. The general form of the shell presents somewhat of a *Paludina*-like aspect. The outer lip is much less expanded and reflected than in *H. meta*, and the texture less glossy and shining.

HELIX RAMSDENI, n. sp. (Plate XX. figs. 6, 7.)

Shell imperforate, turbinate, rather solid, obliquely faintly striated, white, ornamented with a narrow brownish-black band on the lower part of the penultimate whorl, and two broader black bands, one above and the other below the periphery of the last whorl, the central band being irregularly marked with diaphanous white spots; base tinged more or less with suffused chestnut next the columella; spire conical, apex rather obtuse; whorls 5½, convex, the first three somewhat pellucid, the last descending in front; aperture very oblique, truncately oval; peristome white, the right margin expanded, sinuous, and reflected; the columellar margin obliquely descending, flattened and expanded, slightly grooved in the middle, and furnished with a long straight callus terminating abruptly within the aperture.

Diam. maj. 12½, min. 10½, alt. 13 lines.

Hab. ? Solomon archipelago.

This beautiful shell is somewhat allied to *H. boivini* of Petit (*H. subrepta* of Quoy), but it exhibits certain differences so marked as to induce me to characterize it as a distinct species. The whorls of *H. ramsdeni* are more rounded, the last whorl is smaller, and the shell generally somewhat more conical than in *H. boivini*; whilst the peculiar white spots on the central black band remind one of similar markings in *H. ambrosia*, Ang. The beautiful scarlet outer lip so constant in *H. boivini* is entirely absent in the present species; and the shell is of an almost bluish white, while *H. boivini* has a warm yellowish tinge.

I have named this shell in memory of the late Lady Harriet Ramsden, from whose collection the typical specimen originally came.

HELIX MORESBYI, n. sp. (Plate XX. figs. 8, 9.)

Shell umbilicated, globosely conical, moderately solid, finely and irregularly obliquely striated, fulvous chestnut, paler at the apex, with various broad and narrow bands of deep brown, darker below the sutures; spire conical; whorls 6, convex, the last somewhat flattened at the base and excavated towards the umbilicus; aperture oblique, sublunate, within glossy and of a pale purplish hue, lips black, margins approximating and joined by a thin callus, outer margin expanded and subreflexed, columellar margin dilated, partly concealing the umbilicus.

Diam. maj. 23 min. 14, alt. 23 lines.

Hab. Port Denison, Northern Queensland.

In its general character this species comes nearer to *H. yulei*, Forbes, than to any other; but it differs in being larger, very much more conical, and in having the base of the last whorl peculiarly flattened.

HELIX RHODA, n. sp. (Plate XX. figs. 10–12.)

Shell deeply and profoundly umbilicated, depressedly convex, moderately solid, finely obliquely irregularly striated, fulvous brown, scattered with pale, diaphanous, oblique stripe-like spots, with a suffused brown band below the suture, and another darker and narrower band above it, also a narrow dark band on either side of the keeled periphery; spire depressedly conical, apex obtuse; sutures narrowly margined; whorls 6, convex, the last not descending, moderately keeled at the periphery and a little flattened at the base; aperture oblique, truncately ovate, right margin rather sinuous, very slightly expanded and subreflexed, the basal a little thickened, somewhat reflexed, and white.

Diam. maj. 10, min. 9, alt. 5 lines.

Hab. San Christoval, Solomon archipelago.

This shell belongs to the *Trochomorpha* group, its nearest ally being *H. merziana*, Pfr.

HELIX ANGASIANA, Pfr. (not Newcomb, in Ann. Lyceum Nat. Hist. New York).

This characteristic species (first described in the French 'Journal de Conchyliologie,' 1862, p. 228, by Dr. Pfeiffer, from a dead and bleached specimen in a chalky condition, that was sent home by me from the neighbourhood of Lake Torrens, in the interior of South Australia) has been the cause of some confusion amongst conchologists, which I desire to rectify. On my subsequently obtaining living specimens of this species from the same locality I wrote to M. Crosse, the editor of the Journal, stating that the diagnosis should be modified, the specimen figured having lost all its colour and become thickened by exposure to the influences of the atmosphere. This note was published by M. Crosse in the Journal for 1863, in which the colours of the living shell were given. Notwithstanding this, Dr. Cox, of Sydney, in his 'Monograph of the Australian Land Shells,' states that M. Crosse is mistaken, and that the coloration he gives is that of *H. bitæniata*, Cox, also from South Australia, and persists in regarding the normal state of *H. angasiana* as "solid, white, and porcellaneous," and furthermore gives "*H. angasiana, not* Pfeiffer," as synonym of *H. bitæniata*, Cox, in his 'Monograph.' The coloration of *H. angasiana*, when fresh, is singularly like that of *H. bitæniata*, although the form and characters of the two species are extremely different. I have therefore given a figure of both the species on the accompanying plate, which ought to set the matter definitively at rest. I may add that *H. bitæniata*, Cox (1868), is a synonym of *H. flindersi*, A. Ad. & Ang., (P. Z. S. 1863), the description of which was unfortunately also taken from a bleached specimen from which the bands had disappeared.

The shell described and figured as *H. angasiana* by Dr. Newcomb in the 'Annals of the Lyceum of Natural History of New York,' in May 1860, must stand as *H. bougainvillei*, it having been described and figured under the latter name by Dr. Pfeiffer in the 'Proceedings' of this Society in February 1860 (see P. Z. S. 1860, p. 133).

EXPLANATION OF PLATE XX.

Figs. 1–5. *Helix beatrix.*
Figs. 6, 7. *Helix ramsdeni.*
Figs. 8, 9. *Helix moresbyi.*
Figs. 10, 11, 12 *Helix rhoda.*
Figs. 13, 14. *Helix angasiana.*
Figs. 15, 16. *Helix bitæniata.*

3. Notes on some of the Blue Crows of America. By P. L. Sclater, M.A., Ph.D., F.R.S., and Osbert Salvin, M.A., F.R.S.

[Received January 9, 1875.]

The typical Crows (*Corvus*) are, as is well known to naturalists, in the New World essentially a northern form, and have only penetrated into the Neotropical Region as far south as the highlands of Guatemala and the northern Antilles. Several genera of Blue Crows take their place in Central and Southern America. Of these, in our 'Nomenclator,' we enumerated 32 species as autoptically known to us. But during the past three years the receipt of additional specimens and examination of others in different collections has enabled us to add slightly to the number, and to make certain rectifications in our own list. These we beg leave to submit to the Society.

1. Cyanocitta* argentigula.

C. argentigula, Lawr. Ann. Lyc. N. Y. xi. p. 88 (1875).

Under this name Mr. Lawrence has recently described a Jay from Costa Rica with which we are not yet autoptically acquainted. It is apparently a well-defined species, belonging to the group containing

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* The type of the genus *Cyanocitta* of Strickland is *Garrulus cristatus*, Linn., as stated in precise terms by the founder of the genus (Ann. Nat. Hist. xv. p. 261, 1845); and we therefore cannot understand why the authors of 'North American Birds' and other American writers persist in giving the type as *Garrulus*

C. nana and *C. pumilo*, and partakes to some extent of the character of both, in having the crescentic white frontal and superciliary marks of the latter, and the throat coloured as in the former species. It is probably the representative in Costa Rica of the Guatemalan *C. pumilio* and the Mexican *C. nana*.

2. CYANOCITTA BEECHEII (Vig.): Scl. et Salv. Nomencl. p. 39.

There are three somewhat similar species of *Cyanocitta* of a uniform black below, two only of which are inserted in the list in our 'Nomenclator' under the names *C. beecheii* and *C. crassirostris* These three birds may be readily distinguished as follows:—

a. Frontis crista tenui elongata nigra............ 1. *sanblasiana*.
b. Frontis plumis brevibus erectis, crista nulla.
  a'. Major: dorso læte cæruleo, naribus plumis frontalibus omnino tectis 2. *beecheii*.
  b'. Minor: dorso viridi-cyaneo, naribus plumis frontalibus dimidio tectis 3. *germana*.

The synonymy of these species should stand as follows.—

CYANOCITTA SANBLASIANA.

Geai de San Blas, Néboux, Rev. Zool. 1840, pp. 290, 323.
Pica sanblasiana, Lafr. Mag. de Zool. 1842, Ois. t. 28.
Cyanocorax de San-Blas, Prév et Desmurs, Voy. 'Vénus,' v. p. 200.
Cissilopha sanblasiana, Bp. Consp. i. p. 380; Lawrence, Mem. Boston Soc. N. H. ii. p. 284.
" *Cyanurus geoffroii*, Bp." Gray, Hand-list, ii. p. 4, et in Mus. Brit.

Hab. Western Mexico: San Blas (*Néboux*); Acapulco (*Leclancher*); Plains of Colima, Manzanilla Bay and Las Trochas (*Xantus*).

Mus. S.G., Acad. Philad., Brit.

Except as regards its thin frontal crest, this bird does not differ materially in form from its allies; and we see no reason for making a genus of it, as proposed by Bonaparte. The species is rare in European collections. Messrs. Salvin and Godman's specimen is one of Xantus's collection from the plains of Colima, and was presented to them by the Smithsonian Institution. There is a single mounted example in the Gallery of the British Museum, marked *C. geoffroyi*. In the Jardin des Plantes there is also one mounted specimen of this species.

It should be noticed that the figure of this bird in the 'Magasin de Zoologie' gives the bill yellow, showing that in this species, as in its two allies, this is a variable character, probably depending on sex.

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californicus. Again, the type of *Cyanurus*, Sw., is not *Garrulus cristatus*, as given in the above mentioned work, p. 271. This error was caused by Mr. G. R. Gray's unauthorized assumption that the *first* species in any author's list must necessarily be his type. But Swainson himself tells us that the first three species which he mentions (i.e. *C. cristatus*, *C. stelleri*, and *C. sordidus*) are "aberrant," and that the "*typical*" species are only found in the "tropics of America and India." It is obvious therefore that *Cyanurus*, Sw. (1831) = *Cyanocorax*, Boie (1826), as stated by Strickland *l. s. c.*, and that *Cyanocitta* is the proper generic name for the "Blue Jays" of America, as used by us in our "Nomenclator."

CYANOCITTA BEECHEII.

Pica beecheii, Vig. Zool. Journ. iv. p. 353 (1829), et Beechey's Voy. Zool. p. 22, pl. 6.

Cyanocitta crassirostris, Bp. Consp. i. p. 378 (1850).

Cyanocorax geoffroii, Bp. C. R. xxxi. p. 564 (1850).

Cyanocorax beecheyi, Finsch, Abh. Nat. Ver. Bremen, vol. ii. p. 333.

Cyanocitta beecheyii, Lawr. Mem. Boston Soc. N. . ii. p. 283.

Hab. North-western Mexico; Mazatlan (*Grayson* and *Bischoff*); Tres Marias Islands (*Xantus*).

As far as can be told by the imperfect diagnoses in Bonaparte's 'Conspectus,' his "*C. beachii*" is founded on a yellow-billed specimen of the next species, and his *C. crassirostris* on a black-billed specimen of the present bird. Grayson says decidedly that the colour of the bill in the present bird is a sexual character; and there is not much doubt that he is correct. Bonaparte's *C. geoffroii* is also undoubtedly based upon an individual of this species.

There is no example of the true *C. beecheii* in the British Museum. In the Galerie of the Jardin des Plantes there are four, all labelled "*Cyanocitta geoffroii*, Bp." Two of these are from the Voyage of the 'Vénus,' from San Blas and Mazatlan respectively, that from San Blas being doubtless Bonaparte's type.

CYANOCITTA GERMANA, sp. nov.

Cyanocitta beachii, Bp. Consp. i. p. 378. (nec. Vig.).

Corvus (Pica) beecheii, Eyd. et Gerv. Mag. de Zool. 1836, pl. 72, et Voy. 'Favorite,' pl. 20.

Cyanocitta crassirostris, Salv. Ibis, 1861, p. 353; Moore, P. Z. S. 1859, p. 57; Lawrence, Ann. L. N. Y. ix. p. 201.

Cyanurus beecheii et *C. crassirostris*, Gray, Hand-list, ii. pp. 4 & 5.

Hab. Belize (*Salvin, Dyson & Leylan*); Peten (*Morelet*); Merida, Yucatan (*Schott*).

We have already stated that this bird is probably the *C. beachii* of Bonaparte's 'Conspectus.' Dr. Pucheran first pointed out the difference between the figure of Eydoux and Gervais in the 'Magasin de Zool.' (which we suppose to be also intended for it) and that of Vigors representing the true *beecheii*, and associated the former with Morelet's specimens from Yucatan.

Not having looked sufficiently deeply into the complicated errors of previous workers, we have hitherto used the term *crassirostris* for the present bird, and have been followed therein by other writers. But, as hinted by Pucheran*, there can be little question that the insufficient diagnosis of Bonaparte's *C. crassirostris* was really taken from a black-billed *C. beecheii*.

As in *C. beecheii*, both yellow and black-billed specimens occur in the present species. Of two examples obtained by Salvin at Belize, one has a black bill and the other a yellow. The latter, moreover, has slight white tips to the lateral rectrices, which we look upon as a characteristic of the female of this species. The *C. beecheii* of Gray's Hand-list is based upon three similar yellow-billed and white-tipped specimens, in the British Museum, two of which were obtained by Dyson in British Honduras.

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* Rev. Zool. 1858, p. 196.

In the Gallery of the Jardin des Plantes are two specimens of the bird. One of these, labelled "Mexique," has a yellow bill and white tips to the tail. The other is a partial albino, and has the black portions of the plumage, except the tibiæ, white. It agrees with the short diagnosis given by Bonaparte of *Cyanocitta beachii*, jr. (Consp. p. 378), and is doubtless the bird from which it was taken. Amongst the skins at Paris is one example of this species from Merida (Yucatan), with yellow bill and white-tipped rectrices. This is marked in the handwriting of Jules Verreaux as the type of Bonaparte's *crassirostris*; but this is clearly an error. It is, no doubt, the specimen referred to by Pucheran (Rev. Zool. 1858, p. 196) as having been brought by Morelet from Guatemala.

CYANOCITTA JOLYÆA, Bp. Journ. f. Orn. 1853, p. 47; Tacz. P. Z. S. 1874, p. 524.

Of this rare bird we have never been able to procure specimens, but have examined that in the Paris Museum (probably Bonaparte's type) and convinced ourselves that it is an excellent species. There is likewise an example of it in the Copenhagen Museum, obtained by Prof. Reinhardt when at Lima, along with the specimen of *Iridornis reinhardti* (Ibis, 1865, p. 495, pl. xi.). We have not seen Taczanowski's specimens, but have little doubt that they really belong here, and that the bird is from the Junin district of Peru. Further south in the Cuzco district and in Bolivia *C. viridi-cyanea* takes its place*.

CYANOCITTA ARMILLATA, G. R. Gray.

The series of this bird in our collections present three recognizable forms, not including *C. turcosa*, Bp. These are from three different mountain-ranges of Columbia and Venezuela, namely the Andes of Merida, the central range of Bogota and Pamplona, and the Quindiu range, between the Cauca and Magdalena valleys. They may be distinguished as follows, but are hardly worthy of specific rank.

a. MERIDANA.

Cyanocitta armillata, Scl. et Salv. P. Z. S. 1870, p. 788.

In this form the whole upper surface is deep blue without any greenish tinge on the lower back and tail; the head is likewise barely lighter, not of a silvery blue as in No. 2. Below also the plumage is of a darker blue and quite uniformly coloured except on the throat, within the black neck-collar, where it is lighter, but not so bright as in the Bogota bird.

Of this form Goering obtained specimens in the upper wood-region of Merida, three of which are now before us.

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* *Cf.* P. Z. S. 1873, p. 185.

β. BOGOTANA.

Cyanocitta armillata, G. R. Gray, in Gray & Mitch. Gen. of B. pl. lxxiv.; Wyatt, Ibis, 1871, p. 330.

This is the ordinary "Bogota" form, and is, we suppose, that figured by Gray and Mitchell, as above quoted; but no description is given. It is much nearer to the last than to the succeeding, having no greenish tinge to the blue. But the throat is lighter, the head paler, and the upper surface generally not quite so dark. Mr. Wyatt's skin from Pamplona belongs strictly to this form.

γ. QUINDIUNA.

Of this form Mr. T. K. Salmon has lately sent us many examples from the Cordillera of Quindiu. The forehead is of a more intense blue than in the Bogota bird; and this colour is continued over the head and shoulders. The lower back, wings, tail and belly below are of a more greenish blue; but the throat within the black collar is of nearly the same tint as in β.

P.S.—Since this paper was written we have received from Mr. Lawrence a separate copy of his paper entitled "Description of a new Species of Jay of the Genus *Cyanocitta*, and of a new Species of the Genus *Cyanocorax*," read October 11th of last year before the Lyceum of Natural History of New York. So far as we can tell from Mr. Lawrence's description, his *Cyanocitta pulchra*, from Ecuador, there described, is a species with which we are not acquainted. But the *Cyanocorax*, for which the name *C. ortoni* is suggested (Ann. L. N. Y. xi. p. 166), is, in our opinion, none other than *Cyanocorax mystacalis*, Geoffr., of which name *C. uroleucus*, Heine, J. f. Orn. 1860, p. 115, is a synonym. Sclater's collection contains a skin of this species from Loxa in Ecuador, which agrees in every respect with Mr. Lawrence's description of his supposed new bird. The association of *C. mystacalis* with *C. cayanus* (by Bonaparte and others) is a great error, as may be seen by reference to the original types of the former now in the Paris Museum and Philadelphia Academy, both of which we have inspected, or even to the sufficiently accurate figure in the 'Magasin de Zoologie.' Whether *C. bellus* of Schlegel is really referable to *C. mystacalis* (as suggested, Ibis, 1868, p. 111) is perhaps not quite certain; for, as pointed out by Mr. Lawrence, Schlegel describes the outer tail-feathers of his *C. bellus* as having their bases blue. An examination of the typical specimen will be necessary to decide this question; but it will, in our opinion, probably turn out to be the case that the assertion made in the 'Ibis' is correct.

March 7, 1876.

Dr. A. Günther, F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of February, 1876:—

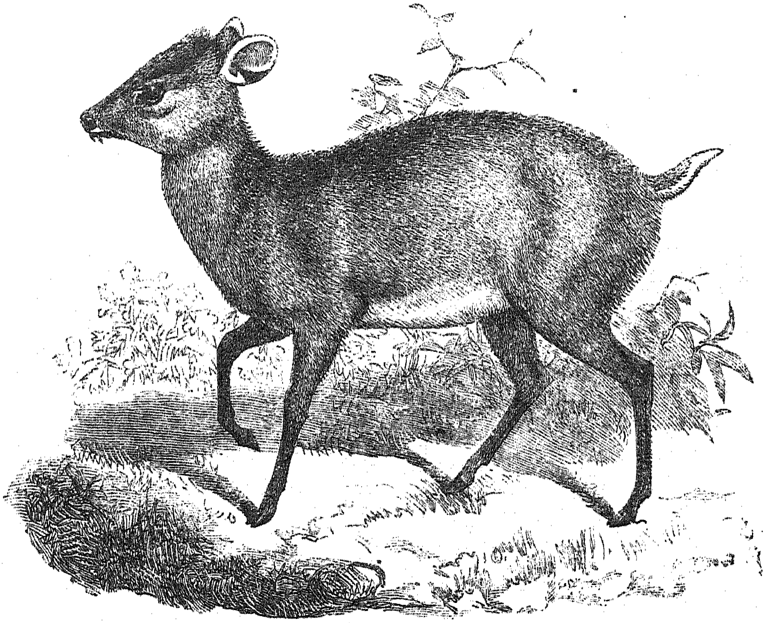
The total number of registered additions to the Society's Menagerie during the month of February was 67, of which 36 were acquired by presentation, 21 by purchase, 5 by exchange, 3 were bred in the Gardens, and 2 were received on deposit. The total number of departures during the same period, by death and removals, was 111.

The most noticeable additions during the month of February were as follows:—

1. An example of the very singular Cervine form lately described by Mr. Swinhoe in the Society's 'Proceedings' as *Lophotragus michianus* (P. Z. S. 1874, p. 452).

This animal was procured by Mr. A. Michie, of Shanghai (the discoverer of the species), in the Ningpo district of China, and forwarded to this country for sale. We purchased it from his agent on the 12th ult. for £35.

The general appearance of the animal is very well indicated in the plate (P. Z. S. 1874, pl. lix.) prepared by Mr. Keulemans from



Lophotragus michianus ♂.

the flat skin upon which Mr. Swinhoe founded the species, and which is now in the Royal Zoological Museum of Berlin.

The animal is a male; and the canines project from the sides of the mouth as in *Hydropotes*. There are no external antlers; but there are hard projecting cores, sensible to the touch, beneath the elongated hairs which form a flattened disk on the forehead, as will be seen by the drawing (see woodcut, p. 273) which I exhibit.

Our Prosector will, no doubt, give us a complete account of this most interesting form when our specimen dies.

2. Two White-backed Pigeons (*Columba leuconota*), from the Himalayas, purchased 16th February; and

3. A Narrow-barred Pigeon (*Macropygia leptogrammica*), from Celebes, purchased 16th February. Both these Pigeons are new to the collection.

4. A Bay Bamboo-Rat (*Rhizomys badius*), from India, received the 16th February.

We have to thank Mr. Wood-Mason, of the Indian Museum, Calcutta, for his present of an example of this interesting Rodent, which is quite new to us.

5. A female Anderson's Kaleege (*Euplocamus andersoni*), from Burmah, presented by Mr. W. Jamrach, 18th February.

We have not previously received examples of this species of Kaleege, which is curiously intermediate between *E. nycthemerus* and *E. lineatus*.

Mr. Sclater exhibited a skin of a female of Anderson's Pheasant (*Euplocamus andersoni*, Elliot, P. Z. S. 1871, p. 137), which had been obtained alive from Burmah by Mr. W. Jamrach, along with another specimen of the same sex, which he had presented to the Society's collection.

Mr. Sclater stated that there could be little doubt that the *Phasianus crawfurdii*, J. E. Gray, in Griffith's Cuv. Anim. Kingdom, vol. viii. p. 27, established upon a drawing in the possession of Mr. Crawfurd (which Mr. Gould had reproduced in his 'Birds of Asia' as the female of *E. prælatus*) was really the female of *E. andersoni*, which species should therefore, in strictness, be called *Euplocamus crawfurdi*.

Dr. Günther exhibited specimens of *Antechinus minutissimus*, obtained by one of Herr Godeffroy's collectors in the neighbourhood of Rockhampton, Australia,—and called special attention to the great development of the genital organs, even in the young when in the pouch, by which the sexes might be distinguished at this early stage.

Dr. Günther also exhibited, and made observations on, specimens of a species of *Palythoa* (probably *P. actinella* of Oscar Schmidt) parasitic on a Sponge, which had been obtained at Naples by Dr. Balfour, and belonged to the Cambridge Museum.

The following papers were read:—

1. On the Anatomy of *Aramus scolopaceus*.

By A. H. Garrod, M.A., F.Z.S., Prosector to the Society.

[Received February 7, 1876.]

It being very seldom that an opportunity occurs for the study of the anatomy of *Aramus*, a form the exact relations of which are but little understood, I take the opportunity of describing this bird from a female specimen which reached the Society's Gardens alive, and died, much emaciated, within a few days, on Oct. 7, 1875. I may mention that the generic name *Scolopax* was applied to it by Linnæus, and that Lichtenstein termed it *Rallus gigas*. Mr. G. R. Gray [*] places it among the Rallinæ, next to *Rallus aquaticus*, whilst Messrs. Sclater and Salvin [†] include it among the Alectorides, together with *Eurypyga*, *Cariama*, and *Psophia*. It seems to me, however, that, considering its different anatomical features, it is most intimately related to *Grus*, which, with it, is not distant from *Ibis*, *Platalea*, and *Eurypyga*.

With reference to the skeleton of *Aramus*, it may be mentioned that it is figured as a whole in Eyton's 'Osteologia Avium' (pl. xiv. K), and in the same valuable work (pl. 27. fig. 2) a front view of the sternum, and a back view of the pelvis are given, though the plate is incorrectly lettered.

In Audubon's 'Ornithological Biography' [‡] a full account of the viscera is given, with a woodcut of the alimentary canal. The author considers the bird to be most intimately allied to the Rails.

Aramus is a strongly schizorhinal bird [§]; in other words, the openings of the external osseous nares extend further backwards than the posterior ends of the nasal processes of the præmaxillæ. In this respect it agrees with *Grus*, *Eurypyga*, and the Limicolæ, but not with the Rallidæ, nor with *Cariama*, nor with *Psophia*.

As in *Grus*, *Ibis*, and *Platalea*, the lachrymal bones do not blend with the region of the skull where they are attached; in the true Limicolæ they do so. The palate is schizognathous, the maxillopalatines long, the vomer pointed, and the pterygoids out-spreading at both ends exactly as in *Grus*. As in that genus, also, there is a pair of occipital foramina, like those in *Ibis*, *Platalea*, and the Limicolæ; but these do not occur in the Rallidæ, nor in *Cariama*, nor in *Psophia*. (Figs. 1, 2, and 3, p. 276, illustrate these points.)

The sternum is completely Gruine, as are the other parts of its skeleton.

The *pterylosis* of *Aramus* has been fully investigated by Nitzsch [‖], who found that it agrees exactly with that of *Psophia* and *Grus*, and with no other bird. The peculiarities of the feathers themselves led that illustrious naturalist to place it with the Rails, from which it differs in more than one pterylographic particular.

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[*] Hand-list of Birds, vol. iii. p. 58.

[†] Nomenclator Avium Neotropicalium, p. 141.

[‡] Vol. iv. p. 547 *et seq.*

[§] *Vide* P. Z. S. 1873, p. 33.

[‖] Ray Society's English Translation, p. 125.

There are two carotid arteries; and the right jugular vein, as is frequently the case, is considerably the larger of the two.

The trachea is simple (the specimen is a female); the syrinx is somewhat dilated; and a single pair of intrinsic muscles is continued to the bronchial half-ring.

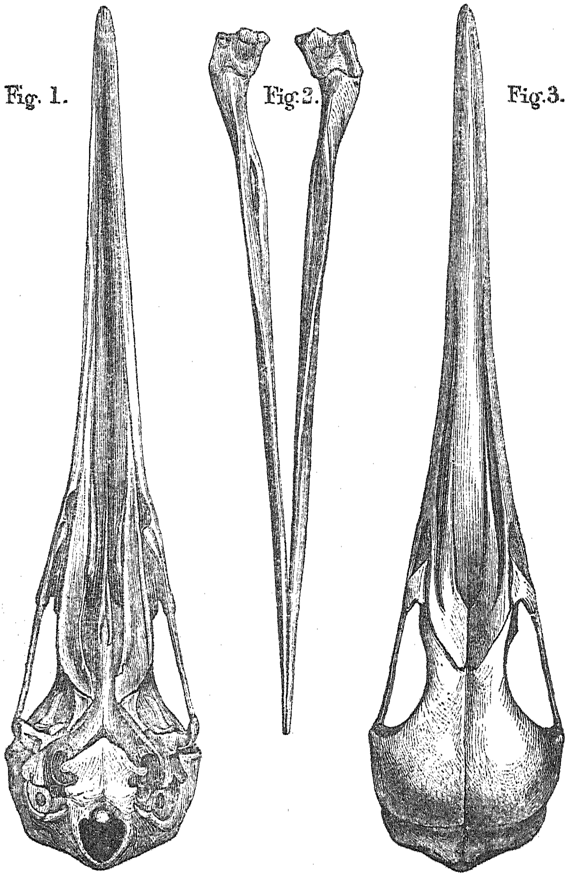

Fig. 1. Skull of *Aramus scolopaceus*, palatal view.
2. Ditto ditto lower jaw.
3. Ditto ditto top view.

Myologically, the ambiens muscle is strong; the femoro-caudal (A) is absent, the accessory femoro-caudal (B) is thin and small; the semitendinosus (X) and the accessory semitendinosus (Y) are fairly developed. Its muscle-formula[*] is therefore B,XY. In *all* the Rallidæ the formula is AB,XY, the femoro-caudal being large. In

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[*] *Vide* P. Z. S. 1874, p. 111.

Psophia it is B,XY, as it is in *Cariama* (in *Chunga* B is also absent). In *Balearica regulorum* the formula is XY; in *Grus antigone* it is AB,XY, the femoro-caudal being reduced to almost a thread; in *Anthropoides virgo* the formula is AB,XY, as it is in *Ibis* and *Platalea*, as well as in *Eurypyga*. Myology therefore does not militate against the Gruine affinities of *Aramus*.

Further, as in *Grus*, the tensor fascia covers the *biceps cruris*; the *biceps humeri* muscle sends a special belly into the patagium; the *expansor secundariorum* is Ciconine; the obturator internus has a triangular origin*.

Alimentary canal.—The *tongue* is 2½ inches long, very slender, quite smooth, nearly cylindrical, and tapering to a fine point in front. It has a slight papillary fringing at its posterior edge. The *œsophagus* is very capacious, although no crop is developed. The *proventriculus* is zonary; its glands are cylindrical and short. Between it and the gizzard is a capacious dilatation of the termination of the gullet, lined, apparently, with squamous epithelium, the volume of which is greater than that of the interior of the gizzard itself. The gizzard is not large, and its muscular walls are not thick. The *liver* has the left lobe a little larger than the right, a condition far from common among birds; the gall-bladder is present. The average-sized, or slightly narrow, *intestines* are 40 inches in length. The *cæca* are somewhat dilated toward their blind ends; they are 2 and 2¼ inches long. They are peculiar in being situated laterally, and close together, instead of opposite one another, a condition approximated to in most of the non-columbine Schizorhinal birds, and in them only; the small intestine therefore enters the colon by a lateral, slit-like opening. In the Cranes the cæca are generally between 5 and 6 inches long; and they being so much larger, the comparative size is much the same. In *Ibis*, *Platalea*, and *Eurypyga* they are very much shorter; in *Cariama* they measure 10 inches, whilst in *Psophia* their length is much the same as in *Aramus*.

2. On the past and present Geographical Distribution of the Large Mammals of South Africa. By T. E. Buckley, B.A., F.Z.S.

[Received February 7, 1876.]

After I had made arrangements for an expedition to South Africa, principally for the purpose of sport, in 1873, the University of Cambridge offered me a grant from the "Wort's Fund," on the condition that I should send home a collection of specimens equal in value to the amount of the grant, and should also make a report to the Vice-Chancellor, detailing any observations that I thought of sufficient importance to be preserved.

As the larger Mammals are yearly receding further into the interior, and as their total extinction is only a question of time, I thought I could not do better than set down the limits of each of the most important species at the time of my visit, as accurately as it was in my power to ascertain them, adding thereto such particulars as could be obtained from the accounts of former travellers, as to the range of the species at the time of their visit.

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* For further reference to these points, *vide* P. Z. S. 1876, p. 195.

Considering the number of people who year by year visit South Africa for the purpose of shooting, it is wonderful how very little, comparatively speaking, has been written on its zoology. Many books on the sport to be met with there have appeared at different times; and from these a great deal may be learnt; but this information requires a vast amount of collating and sifting. On the larger mammals, of which we are now alone speaking, Harris's 'Wild Animals of Southern Africa' is perhaps the best book, giving, as it does, a plate and description of all those met with by the author. Dr. A. Smith's work on the Zoology of South Africa gives us descriptions and plates of only ten of the larger animals: the plates are decidedly inferior to those of Harris; and the colouring in one or two instances is wrong. These two are the latest works on South-African mammals; and when we consider the enormous number of animals killed year by year there, and the consequent impending extermination of these creatures, some of which even now are extremely scarce, it is to be hoped that some one will before long take in hand to set forth their complete life-history.

I am glad to say that now there are game-laws both in Cape colony and Natal, which, late though it is, will at least preserve a remnant of some of the larger animals, such as the Hartebeest and Eland. Of the smaller Antelopes there are still plenty; the existence of any of the larger species in the colonies will be noticed under the proper heading, when I could get reliable information concerning them.

The Tsetse fly has been of great service in preserving animals, comparatively few hunters caring to shoot on foot in such a hot climate. This is the reason why the Zulu country has so long held large game, its southern boundary being only some seventy miles from D'Urban; but now, since it has become the fashion for the hunters to arm natives to shoot for them, even in this country, favoured as it is by abundance of grass, water, and shelter, extermination is going on rapidly—so much so that a friend writes me saying that after next winter he does not think that it will be worth his while going to hunt in his old haunts; and yet this very country only some ten or fifteen years ago swarmed with game to an incredible extent. The result of the extermination of the game is that the Tsetse disappears, thus giving a greater extent of country for the rearing of domestic cattle.

The Tsetse appears to be found mostly where there are large herds of buffaloes, and is said, in some cases, even to migrate with these animals; at other times it appears a very local insect,—in one case a well-beaten road up country passing very close to its haunts; and, I believe, at night cattle may be driven through these localities with perfect safety, care being taken to be outside before the break of day.

My route from Natal was as follows:—I left Pietermaritzburg on the 15th of May, crossed the Drakenberg range on the 6th of June; on the 8th the bullocks were lost, which delayed me about a week; but I reached Pretoria on the 28th of June. I left again on the night of the 30th, and struck the Crocodile or Limpopo river on the 10th of July, and travelled slowly along the river for the sake of some shooting. Bamangwato was not reached until about the 5th or 6th of August. I was detained here about a week, but at last left on the 12th. Unfortunately I took a wrong road on the way to the Tati, and had to retrace my tracks for some considerable way, which delayed my arrival there until the 28th of August. I left the Tati on the 1st of September, and reached the Samouqui river, my furthest point, about the 12th of the month. The route on my return journey was precisely the same, but took less time, owing to the much lighter load to be carried down. My waggon arrived in Pietermaritzburg on the 3rd of January 1874.

My stay in the country having been very short, from the end of April till the middle of the following January, and not much more than the half of that time having been spent in a game country, my notes cannot be very extensive. I shot twenty-two different species of animals, and saw others,—a fair number, considering I had to do all my shooting on foot, and with very little aid from the natives.

I have been aided in my notes by friends whose experience was much greater than mine, and also by such books as I could get; but, being so far away from a library, there were, of course, many to which I could not refer: this must be taken as an excuse for many errors into which I may have fallen. I have purposely avoided giving descriptions of any animals, as they are mostly described in Harris's book from actual specimens.

In the Table exhibited (see pp. 291, 292) I have endeavoured to give the geographical distribution of these larger animals in Southern Africa, as far as I could gather it, both at present and formerly; but I could get no information concerning Natal and the countries immediately south of it, though it is probable that the coast-line, where it represents the Zulu country, would be occupied by the same animals.

Apparently most of the South-African Antelopes have their representatives to the north and west; thus the Waterbuck is represented by the Sing-Sing on the west, and the Méhédet of Baker on the north. Many other instances might be mentioned. Some species, again, are common to the whole of Africa, as the Giraffe and one species of Black Rhinoceros; others, again, are very limited in range, as the Blesbock.

The horns of all species of Antelope, whatever their shape may be hereafter, are the same when young, and consist of two small stumps three or four inches long, standing almost straight up. While the horns are growing, especially during summer, their bases are quite soft, and for a considerable way up can be pulled off in flakes.

1. Elephas africanus. (The Elephant.)

Excepting the few still preserved by Government in the Knysna

Forest, the Elephant may be considered extinct in the Cape colony and Natal. Seven and twenty years ago it was found in the bush around the town of D'Urban in the Natal colony, but now is almost exterminated even in the Zulu and Amaswazi countries. In the great reed-beds that exist in the neighbourhood of Santa-Lucia Bay in the former country, a few still remain, owing to the almost impossibility of getting at them; and in the Amaswazi country a few, I am told, are occasionally found under the Bombo Mountains. North of Delagoa Bay they get more numerous, especially so, I am told, in Umsila's country. In the Matabili land the Elephant is to a certain extent preserved, no one being allowed to hunt these animals without the permission of the king. North of the Zouga they are still fairly numerous; but with the immense number of hunters and traders, the destruction must be great indeed, and bids fair to exterminate the race in South Africa altogether, especially when we consider the very slow rate at which these creatures increase, and that cows and bulls are shot indiscriminately.

North of the Zambesi the Elephant is found through Central Africa into Abyssinnia, and along parts of the west coast. In some places they occur in vast herds, as seen by Livingstone (Zambesi Tributaries, p. 134), cows and bulls together. The number of trees destroyed by these animals is enormous; along the rivers Makloetze and Shashai, in the Bamangwuto district, the thick mimosa-groves which border their banks have been altogether destroyed by the ravages of these creatures.

The tusks of the cow Elephant are much thinner than those of the bull; but the hollow inside does not extend so far down. The largest tusk I heard of was one brought from Lake Ngami in 1872; this weighed 170 lb.; but its fellow was rotten and worthless. I have seen a pair weighing 90 lb. each; but such a perfect pair are, I believe, not common.

When Elephants are disturbed by shooting now, they often go great distances, passing through a large extent of thirst-land to a distant water; so fearful are they of fire-arms.

2. RHINOCEROS KEITLOA. (The Keitloa Rhinoceros.)

3. RHINOCEROS SIMUS. (The White Rhinoceros.)

Of African Rhinoceroses there are at least three distinct species, the fourth, *R. oswellii*, being, I fancy, rather a doubtful one. The two "black" species are *R. bicornis* and *R. keitloa*; they may at once be distinguished from the White Rhinoceros by their overhanging upper lip, which enables them to grasp the bushes on which they, I believe, exclusively feed. The only black species I met with was *R. keitloa*, observed on two occasions—once singly, another time an old female and her calf about half-grown, which latter was secured. Owing to incessant persecution these animals are now getting scarce, eight Rhinoceroses only having been seen by our party. At one time they must have been extremely common, judging from the number of skulls seen lying about. Harris, in his description of *R.*

simus, mentions having seen eighty of these animals in a day's march; and on one occasion in the space of half a mile he saw twenty-two and had to kill four in self-defence. A friend of mine whom I met on his way down from the Zambesi, told me he had only seen five, all *R. simus*, and all of which he secured.

At one time it was not at all uncommon to see *R. simus* with the anterior horn close on 3 feet and upwards in length; now, however, such animals are rare, most likely from the animal being shot down before it arrived at its full size. The dung of the black and white species differ materially; for whereas that of the former is light-coloured, more resembling that of an Elephant, that of the latter is very dark and much softer: thus a hunter, should he not be experienced enough in "spooring" to know which species he was after, would immediately do so on seeing the dung. Each species of Rhinoceros drinks every night, as may be seen by going in the morning to a waterhole, where their fresh spoor may be found, and the water is generally churned up into a filthy mass of mud. After leaving the water they go a long distance in Indian file should there be two or three together, when they spread out and begin to feed. Having had sight, by studying the wind and quietly (for a Rhinoceros is very quick at hearing) placing one's self near the line in which they are advancing, one may get an easy shot at any distance.

Nearly every Rhinoceros is accompanied by a few individuals of *Buphaga africana*, which rid it of its parasites and give it timely warning of danger. When the animal runs, these birds accompany it, hovering over it like flies above a horse's head, uttering a note something like *chirri-chirri-chit-chirri* all the time. The White Rhinoceros may often be found standing under a tree in the open plains; and at such places the dung collects into enormous masses, showing that the beast comes to the same tree day after day; when the mass gets very high the animal levels it with its horn. The Boreli (*R. bicornis*) always lives in the bush, and is one of the few animals that will charge and hunt a man unprovoked; this species often has a sore place behind the shoulder, which is supposed by the natives to be one of the causes of its savageness. *R. keitloa* is generally known to the hunters by the name of the Blue Rhinoceros.

4. EQUUS QUAGGA. (The Quagga.)

The animal commonly so called, is Burchell's Zebra; the true Quagga I never saw, though Harris mentions it as occurring in great herds, but only to the south of the Vaal river. Whether, since his time, it has become extinct or not is a question; but the few animals of this genus that were seen on the open plains were all clearly Burchell's Zebra. Some few years ago the three species of this genus were in little repute for their skins as compared with the Wildebeest and Blessbok; but of late years it has been discovered that they are of great use for, I believe, connecting-bands for machinery; at any rate their value increased so much that they have been shot down, until you may go for a week through the "High Veldt" and not see one, although there will be thousands of other animals.

5. EQUUS MONTANUS. (The Zebra.)

This species is said still to occur in the Hottentot Mountains near Cape-town; but it was not observed by us, nor did we see a skin during the time we were in Africa; however, as we did not ascend any mountains, where alone they are said to be found, we had no opportunity of judging whether or not they were rare.

6. EQUUS BURCHELLII. (Burchell's Zebra.)

One of the commonest animals throughout South Africa, more especially in the wooded parts. A few years ago it was equally common on the plains even in the north of Natal, but now has either been shot out or driven back by the hunters. This is the Quagga *par excellence* of South-African sportsmen, by whom it is killed, both for its skin, which is now extremely valuable, and also for its meat, which is one of the most palatable morsels you can give to your native servants; but there is a sort of smell about it which, with its dark colour and yellow fat, make it any thing but tempting to most white men. These animals are generally found, at least in the bush, in small parties of from eight to ten, frequently in company with Blue Wildebeests. The largest troop I ever saw contained probably about forty individuals. They are generally in good condition. This species, I believe, when possible, drinks every day; I have seen them at the water at midday, and also coming down again to it in the evening.

Their geographical range is wide: Speke and Grant found them north of Uganda; and at the present time they are common animals in the Zulu country. Their note is a sort of bark, like the Dutch pronunciation of the word Quagga, whence, most probably, came the name. They utter this constantly after being disturbed by a shot, especially if one is wounded and lags behind.

Out of five of these animals shot in one herd, there were individuals showing every variation of colour and marking, from the yellow and chocolate stripes, to the pure black and white, the stripes in some ceasing above the hock, and in others being continued distinctly down to the hoof. I saw a young foal in September, the only one I remember to have seen.

7. GAZELLA EUCHORE. (The Springbuck.)

Still common in Cape colony, and more or less abundant through South Africa up to the Zambesi; it does not, however, occur in the Zulu and Amaswazi countries. Small herds of this species are generally seen mixed up with the Blesbocks and Wildebeests. When disturbed they go off in a series of bounds, opening the white line that extends halfway down the back to the rump, making the animals appear as if wholly white. When they come to a road, they usually spring right across it. Both male and female have horns, those of the latter, however, being much smaller and thinner. The calves are dropped about November, and are then cream-coloured. Gordon Cumming gives an interesting account of the periodical migrations of this Antelope in his work on South-African hunting.

8. ÆPYCEROS MELAMPUS. (The Pallah.)

This graceful Antelope occurs in all suitable localities, from the Zulu country far into Equatorial Africa. In the winter it is found in large herds; but in the summer these generally break up; and they may often be seen in family parties of three—an old ram and doe, and a young one. They seem to be fond of the vicinity of water, far from which I never observed them; when disturbed, they often bound off like a Springbuck. The male alone has horns, which are large for the size of the animal; the skin is much used by the natives for making karosses, at which the Bechuanas are very expert. The Pallah is essentially a wood-loving animal, never being found in the open country. Dr. Burchell seems to have been the first to make this species correctly known; in the second volume of his 'Travels,' p. 301, he gives a description of one that was obtained near Kuruman, where he first met with it.

9. NANOTRAGUS OREOTRAGUS. (The Klipspringer.)

The Klipspringer occurs in greater or less abundance throughout the whole of South Africa. I met with them in the Matabili country, haunting the rocky mounds that rise up so suddenly from the level ground, called "Kopjes" by the Dutch, generally in small parties of three. Their hair, which is long and bristly, is much used by the colonists for stuffing saddles. When alarmed at the foot of a Kopje, they at once ascend to the top; should, however, the hill be a small one, they soon take off across the country if pursued.

The Klipspringer does not invariably stay among rocks and high ground, though it always remains close by, as on three occasions I found them on the level ground at the foot of the stony rises that are so common in the African bush.

10. NANOTRAGUS TRAGULUS. (The Steinbock.)

This species was very common after passing Pretoria, the capital of the Transvaal, into the Matabili country; it is found in the Zulu and in Damara land, and seems spread through the whole country south of the Zambesi. They live either singly or in pairs, often in the driest situations, as they appear to require very little water.

One that I surprised suddenly in the sandy bed of a river lay close like a hare in its form until it considered me too near, when it ran off; they almost invariably stop, however, when they have gone a certain distance—a habit which often leads to their destruction.

The Steinbock feeds in the early morning, when it may often be seen creeping among the bushes; during the middle of the day it lies in a sort of form, and does not stir again until evening.

11. CEPHALOPHUS GRIMMIA. (The Duiker.)

The Duiker is met with through Natal and the Zulu country up to the Matabili country, but is not mentioned by either Andersson or Baines as occurring in Damara land. It is generally found in the bush-country solitary; when disturbed it rarely stands again, as a

Steinbock does, but goes off at once; when wounded it screams like a hare. Like the Steinbock the Duiker lives in the most arid country, seeming to be quite independent of water.

12. COBUS ELLIPSIPRYMNUS. (The Waterbuck.)

A common species, extending from the Zulu country through the east of Equatorial Africa into Abyssinia, as mentioned by Grant and Baker. It seems never to be found far from water, through which it does not hesitate to go when alarmed; it lives in herds of from three or four to as many as twenty, though the old males generally live a solitary life, at least not more than one being found with a herd of females and young. The younger males herd by themselves, as I have shot two out of a small lot of six or seven, their horns then not being more than four or five inches in length. The females are hornless. The Waterbuck is found abundantly through the Zulu and Amaswazi countries up to the Limpopo and Mariqua, which seem to be its boundary in a south-west direction; it is found on the Zambesi, and at least as far to the west as the Botletlie river, where Chapman mentions killing one; but here its place is mostly occupied by the Leché. The flesh of the Waterbuck is so coarse, poor, and tasteless that even the natives do not care for it. From the white ring round its rump the Dutch have given it the name of Kringhat.

13. STREPSICEROS KUDU. (The Koodoo.)

Once common in the Cape colony, the Koodoo, unless there be a very small remnant indeed, is not found now nearer than the Zulu country. Here it yet holds its ground in spite of the yearly persecution of the hunters, by whom it is killed on account of the value of its skin, which is fine, but at the same time tough and durable. It has a wide range, being found through Central Africa into Abyssinia, as recorded by Speke and Baker; but it is remarkable that the finest specimens come from the Zulu country, even animals killed near the Zambesi not having such fine horns; possibly this may be accounted for by the Zulu country possessing better pasturage. The males alone possess horns; the females and young go about in small herds of seven and eight, sometimes one old male accompanying them; this would probably be in the rutting-season; I have also seen a small herd of young males only. This species frequents the bush country exclusively, and seems to prefer that part where there are many stony rises; the tips of the horns of the old males glance in the sun almost like the points of bayonets. The Koodoo is supposed to be able to do with less water than many of the other antelopes; but I have seen them drinking in the middle of the day; they are difficult animals to spoor, as they feed in a scattered manner, sometimes returning on their own tracks a short distance, in a way different from other antelopes; young calves well grown were seen following their dams in September.

14. OREAS CANNA. (The Eland.)

Of all antelopes inhabiting Southern Africa the Eland is the one most liable to extermination; easily ridden down, the best and fattest of all animals, the skin of value as well, it is year by year diminishing in numbers. Throughout my travels I only saw them on two occasions, and never obtained a specimen; I have at different times seen their fresh spoor (which resembles that of the buffalo, but is rather smaller and rounder) in the driest spots through which we passed; and it is said they require very little water. Harris speaks of these animals as occurring in vast droves in the open country south of the Vaal river; now the Eland is only to be found in the more remote wooded country. A few yet remain in certain parts of Natal, one locality being Bushman's River, where, luckily, they are now carefully preserved.

15. TRAGELAPHUS ANGASI. (The Inyala.)

This fine Bush-buck inhabits the bush bordering the sea-coast along the Zulu and Amaswazi countries, from the Inyalazi river (its southern boundary), as far north at least as Delagoa Bay, probably beyond this. It appears to be very local, never, as far as I could hear from the hunters, being found out of this limit. The Inyala lives in small herds, the old rams being generally solitary; but the younger ones accompany the females. They inhabit the very thickest bush.

16. ALCELAPHUS CAAMA. (The Hartebeest.)

Why the Hartebeest should have become so rare is a matter of conjecture; but from being one of the commonest animals throughout the Cape colony (according to Harris, up to the tropic of Capricorn), it is now one of the rarest of the antelopes. We observed it only on three or four occasions, once just before reaching the Crocodile River, and once or twice in the colony of Natal, where, being preserved, it is now becoming fairly common. At the time of Harris's visit to South Africa it seems to have been extremely abundant, mingling with the vast herds of Blesbocks and Wildebeestes. A few are met with about the Bamangwato hills; Col. Grant mentions having met with this species as well as *A. lichtensteini* in Equatorial Africa. A friend tells me, however, that he never met with it from Shoshong (the capital of the Bechuanas) to the Zambesi. It is not mentioned by Baines, Andersson, or Chapman as occurring in South-west Africa. In the south-east, again, a few still remain in the Zulu country, as well as in Natal; but I could not hear of it as occurring in the Amaswazi country, where its place is taken by the Sassabye. The Hartebeest prefers the open country or where the bush is, at best, very scanty: the three or four we saw near the Crocodile River were very shy, not allowing us to approach nearer than five or six hundred yards.

17. ALCELAPHUS LUNATUS. (The Sassabye.)

Although, in Harris's time, the Sassabye appears to have been common on the plains, at the present day it is essentially a bush-loving animal. According to Dr. O. Smith the Sassabye was rarely known to advance to the south of Latakoo; at present its southern limit appears to be the Amaswazi country; along the Limpopo it is very common, and continues so into the Matabili country up to the Zambesi. The old males do not seem to associate with the females; nor do they appear so common, as out of nearly a dozen obtained by us only two were males, and one of these was immature. We observed very young calves in October. The Sassabye runs with a peculiar gait, reminding one of a rocking-horse; its shoulders are very high, sloping away to the rump; it does not seem to be a very shy animal.

18. ALCELAPHUS ALBIFRONS. (The Blesbock.)

Persecuted though it is, the Blesbock still continues to hold its ground, occurring through the Orange Free State and the Transvaal in countless numbers. In the winter they migrate south, a straggler coming even as low as Harrismith; in the summer, again, they go north of the Vaal river. They do not seem ever to have occurred much to the west of 24° east long., or north of 25° south latitude; on the east the Drakenberg range is the boundary. At one time they were found in the Cape colony, but were scarce there even in Gordon Cumming's time: the extensive plains in the Orange Free State and the Transvaal, however, were probably always the head-quarters of this species. Why the Blesbock should still be so numerous, and the Bontebock, *D. pygarga*, almost extinct whereas, according to Harris, in 1836 it was almost as common as the Blesbock, is a problem not easily solved, inhabiting as they did the same localities, and feeding over the same ground. In habits, size, and appearance the Bontebock is almost identical with the Blesbock; yet out of the vast herds of the former all that remain are a few individuals carefully preserved in the old colony near Cape l'Agulhaz. The Blesbock calves in November, the young at first being a sort of creamy brown colour; the males and females live together in the same herds: these, when disturbed, invariably run up the wind, carrying their heads down.

19. CATOBLEPAS GNU. (The common Gnu.)

When Harris first entered the colony in 1836, the common Gnu was met with in Graaf Reinet; now, however, their numbers are so much reduced by continued hunting, that it is not until we come to about fifty miles south of the Vaal river that any are seen. In winter a few wander to within a few miles of Harrismith; but in summer as we were coming to Natal we only saw them after crossing the Vaal. On the 20th of June I saw quantities of Wildebeest and Blesbocks that were spreading themselves over the plains south of the Vaal; and this is the time when they are most persecuted, as they are then very poor in condition, and with a good horse may easily be ridden down, especially in the early morning, when they are stiff with the frost and cold. Their skins are valuable, and form one of the chief exports of Natal; and their flesh is converted by the Dutch boers into "beltong." Both sexes have horns; but those of the female are much lighter and do not meet so closely over the forehead.

In summer the colour of their skin is a dark brown; but in winter this turns to black. On taking out the brains when preserving a head there is generally found a quantity of a large white maggot, more like an exaggerated woodlouse than the common maggot; the Blesbock too seems equally afflicted with these creatures. In December we observed lots of young calves; they resembled their mothers in colour; at this time the old bulls lead a solitary life, and seem to be much tamer, as I one day walked up to two on open ground to within one hundred and fifty yards, whereas they will scarcely allow one within five hundred on ordinary occasions. This species is liable to an epidemic which at times, I believe, makes great havoc amongst them; I saw a young one in this condition: all the hair was off as if it had been burnt; and it was unable to rise. It is very amusing to watch the antics of a herd when aroused or excited; when approached to within five or six hundred yards they chase one another round and round for a short time, stand, stare, and paw the ground, then lashing their long white tails against their sides, set off as hard as they can go. They go in herds of from eight to fifty; but I never saw them in such masses as the Blesbocks. They exhibit a good deal of curiosity; three approached our waggon one day when outspanned close enough to allow of my shooting one of their number from the waggon-box, where I was sitting writing.

Although the Orange Free State and the Transvaal are the headquarters of this animal, yet they are found considerably to the north and west of this, as Chapman mentions meeting with this species on the Chobi river, which is in 18° S. lat., and 25° E. long.; Baines and Andersson mention it as common in some parts of South-west Africa through which they travelled.

In summer the old males separate from the herds and live solitary. At this time they fix on one spot, making a sort of lair, to which they will return after feeding or being disturbed. This sometimes leads to their destruction; for if two or three men go together, the old bull immediately gets up and goes away; on this one of the party lies down in the spot lately occupied by the beast, the other two then retire. The Wildebeest thinking every thing is now safe goes quietly back to his particular spot, and is then shot at by the man who is lying down.

20. Catoblepas gorgon. (The Brindled Gnu.)

The Blue Wildebeest, as it is generally called in S. Africa, was at one time found in abundance almost to the borders of Cape colony; but it does not seem to have entered it, according to Dr. Smith's account of that animal; it is yet found in the Zulu country; and, according to Baines and Andersson, it is common in Damara-land. In Col. Grant's 'Observations' sent to the Geographical Society he says:—"This Gnu was found in large herds in Khutu, in the western borders of Uyaramo. It inhabits the park-like country adjoining the river Kingani, and was not seen after crossing the east coast range." It is a common species through S. Africa, very often being in company with Burchell's Zebra. About November the old bulls separate from the herds and go singly; one that I shot about that time had its head plastered with mud, as if it had been using its horns on a bank, like we see the Stags in Scotland during the rutting-season. At one time the Blue Wildebeest inhabited the plains equally with the common Gnu; now, however, it is rarely seen except in the bush-country; like it, too, it generally makes one or two wheels round, when disturbed, before it takes to flight.

21. Hippotragus equinus. (The Roan Antelope.)

This Antelope (except the Eland, the largest of the family) was at one time, according to Dr. Smith, found within the Cape colony; but now its furthest range south seems to be the Amaswazi country, where it is still occasionally shot. It is probable that the Kalahari desert is its south-western boundary, as it is not mentioned by either Baines or Andersson in their works. Dr. Livingstone met with it in large herds on the Leeba; and Schweinfurth shot it in the Djoor district. The Roan Antelope is probably the rarest of the genus; nowhere does it appear very common; Harris in his 'Southern Africa' mentions killing several males of this species, but never seems to have procured a female, as he says in his description of this animal that it is hornless, a mistake copied also by Chapman; this is not the the case, as the female has horns almost as long as the male. The only specimen I procured was shot standing in the middle of a sand river in company with a solitary Sassabye. Both this and the Sable Antelope will charge savagely when brought to bay; their cry of danger or anger is a kind of hissing snort, different from that of other antelopes. Their Bechuana name is "Qualata." From the accounts of natives this species seems to be most common in Umsila's country, which lies to the east of the Matabili.

22. Hippotragus niger. (The Sable Antelope.)

This splendid Antelope was first discovered in 1836 by Capt. Harris on the Magaliesberg hills, where, it is said, one or two still linger; this would seem to be their southern limit, as the species is not found in the Zulu or Amaswazi countries; it is found however at Zoutpansberg, in the north-east of the Transvaal, and probably would be found to extend as far as the coast. To the west Livingstone met with it on the river Leeba, which is in long. 23° E., lat. 12° S.; but it is not mentioned by either Andersson or Baines as occurring in the south-west. To the north, the head of a young one was brought home by Speke, which Grant shot at Ukutu, which would be near the latitude of Zanzibar. The Matabili country is perhaps the locality where it is most numerous; we first met with traces of it near the Makloutze river, where we saw the skin of a large male in the possession of some natives. This species goes about in herds, sometimes very large. I have seen about fifty together; but there are not many old males among them; they are mostly females and young, the adult males generally leading a solitary life. The females of this species carry horns, but not so long as the old males: the colour of an adult female is dark chestnut, white underneath, with a mane reaching to the shoulders; the young are much lighter in colour, whereas an old male is as black as jet. In running, the neck is arched, which throws the horns forward. The Sable Antelope is said to be able to defend itself from a Lion by striking sideways with its powerful horns. Mr. Baines has informed me that he has picked up horns covered with the hair and blood of a Lion. He himself saw a dog pierced through from chest to flank by an old male of this species that was wounded near his waggons.

23. Oryx capensis. (The Gemsbock.)

At one time common in Cape colony, Gordon Cumming having killed it not far from Colesberg, the Oryx or Gemsbock is now, I believe, restricted in that district to a locality not far from Cape L'Agulhaz, where a small remnant are now carefully preserved. It seems never at any time to have spread far to the east, at least not to the Zulu and Amaswazi country, according to the testimony of hunters there; nor does it seem to be common in, if even an inhabitant of, the Transvaal. To the west of that country, however, it is common, being found through Secheli's and Sicomo's territories. The borders of the Kalahari desert, by the Zouga up to Lake Ngami, and Damara Land seem to be the stronghold of this animal. Palatzi, a small water-hole in the Bamangwato district, about 27° E., was the only place where I myself observed this animal; but, being disturbed by some Giraffes, I was unable to get a shot. From what I learnt from hunters at Shoshong, however, it occurs east of this again, but sparingly. A friend told me that he never observed this species either going to or coming back from the Zambesi. I have heard that the Matabili have no name for this animal; but the Bechuana term is "Kokama." A good description of the habits of the *Oryx* is given by Andersson in his 'Lake Ngami.' It may be mentioned that both sexes have horns, these being longer in the female.

24. Bubalus caffer. (The Cape-Buffalo.)

At one time abundant all through the Cape colony, the Buffalo now is found no nearer than the Zulu country; and even there it is getting very scarce. I heard that a small herd exists in Natal, near Bushman's River, where it is very strictly preserved. The largest herd we met with consisted of at least two hundred individuals of both sexes. The value of their hide has led to their gradual extermination in the more accessible parts, and even far in the Matabili country there were hunters killing them for this only. One man, we heard, had got upwards of a hundred in a month; surely no animal can long withstand such slaughter.

On approaching a herd the noise made by the animals rubbing their horns against the trees is very audible, as well as a rumbling sound. There is little danger in attacking a herd, as on the first shot there is a general stampede; but a wounded animal and a solitary old bull are very dangerous; often a solitary animal will charge down in the direction of the smoke of a shot, or after running a certain distance will turn out of the way, and, retiring quietly in the bush alongside its own tracks, will charge on the unsuspecting hunter; and there are few who have not had several narrow escapes from these animals.

We saw very young calves of the Buffalo towards the end of September; and there was a full-grown fœtus in a cow which we killed about that time; when first born they are of a dark brown colour. Buffaloes require water at least once in the twenty-four hours, generally drinking at night, but sometimes in the afternoon; they feed in the morning and evening, but lie still during the heat of the day, in the shade.

Attempts have been made to domesticate the Cape-Buffalo, but they appear to have resulted in failure; not only is the animal too uncertain in temper, but, just as in the wild state it goes to rest during the heat of the day in the shade, so it is that from this reason the Buffalo is less hardy than the Ox, as it is unable to work during a great part of the day.

25. Camelopardalis giraffa. (Giraffe.)

From all accounts it would appear that the Giraffe never occurred south of the Orange River. Sparrmann mentions it as occurring to the north and north-west of the colony in 1772, but seems not to have obtained a specimen. Paterson, in his 'Journey,' published in 1789, mentions that a friend of his killed one just north of the Orange River, which was devoured, however, by lions before he had a chance of inspecting it. Later on he was more fortunate; and at p. 125 he gives a description of one, and a very fair drawing also. To the east, I am informed that, although no longer inhabiting their country, the Zulus have a name for the Giraffe: their country lies between 27° and 29° south; so that 28° would be about their southern range.

At present I should say that the Giraffe does not occur much further south than 24°; it was about in this latitude, where the road leaves the Limpopo river on the way to Shoshong, that we first saw its spoor. Being rarely killed except from horseback, the Giraffe yet holds its own in the "fly"-country, where the Horse cannot enter, and from its enormous length of neck is able to take good care of itself from any one trying to stalk it on foot.

The flesh of a young cow is very good, and the marrow-bones excellent; its skin is used by the natives for making sandals, and by hunters and traders for making reins.

The Giraffe lives in small herds of from three to twelve; it inhabits the driest country, feeding on the young shoots of the mimosa trees, and occasionally on a small green fruit resembling an apple. When hunted they go off at a great pace, though it does not appear so, their long necks oscillating like a pendulum, and their tails screwed up over their rumps.

The following Table gives a summary of my conclusions:—

NAME.	PRESENT DISTRIBUTION *.	PAST DISTRIBUTION.
1. *Elephas africanus.*	A few still found in Cape colony, in the Knysna forest.	Common through the whole of S. Africa.
2. *Rhinoceros keitloa.*	Found in the Zulu country, in places similar to those of the White Rhinoceros.	No information, as this species was not distinguished from *R. bicornis* until about 1836 by Sir A. Smith. He says, "We may infer that the Keitloa has not, at least for many years, been in the habit of generally extending his range higher than about 25° S. lat."
3. *R. simus*	Still found in the Zulu country about lat. 28°, not further west than long. 31°, until we come to lat. 24°; there found everywhere more or less commonly in suitable localities.	First found by Burchell at Latakoo in 1812, lat. 27°, long. 24°, said by the natives at that time to have occurred frequently even south of this.
3 *a*. *R. bicornis*........	Same as preceding species, but probably extends westwards a little sooner than it does.	In 1652 common on Table Mountain; in 1775 found by Sparrmann in lat. 32°; in 1812 mentioned by Dr. Burchell as almost exterminated in that latitude. Last one in Cape colony seen in 1849 in the Zuurberg and Addo bush (*vide* Gordon Cumming's book, vol. i. p. 48). Zuurberg is in lat. 33°.
4. *Equus quagga*	Unknown apparently, the Quagga so often mentioned by African hunters being *E. burchellii*.	At one time very common through the colony up to the Vaal river, which is said by Harris to be its northern limit. In his time it was very numerous in the extensive plains north of the Vaal river, in 1836.
5. *E. montanus*	Said still to occur in the mountainous districts of George (?), in the Cape colony. Mentioned by Livingstone as occurring on the Zambesi in about 1861, and by Baines in Damara Land in 1851; but its proper limits are very imperfectly known.	Probably the same limits as now.
6. *E. burchellii*	From 29° lat. in the Zulu country, in any place where there is any large game, but getting very scarce in the open places of the Transvaal and Orange Free State.	It is likely that this species only occurred to the north of the Orange River, taking the place of the real Quagga.
7. *Gazella euchore* ...	Still found through the colonies, but sparingly in comparison to former years. Abundant in grassy plains through the Orange Free State and the Transvaal.	Extremely common everywhere in suitable localities, but not further east than the Drakensberg Mountains.
8. *Æpyceros melampus.*	Still inhabits the Zulu country, getting commoner the further north; very common on the Limpopo from about lat. 25° to the west. Mentioned by Baines in 1861 as being found first in long. 18°, lat. 22° 30′.	Found by Burchell at Kuruman in lat. 27° 6′, long. 24° 39′, who calls it one of the rarer Antelopes, probably did not occur much to the south in this part of Africa.
12. *Cobus ellipsiprymnus.*	Found in the Zulu country; common on the Mariqua and Limpopo rivers, lat. 25°. Probably does not extend much further west than long. 24°.	Seems not to have been found very far from its present limits.
12 *a*. *C. leechi*	To the west this species does not apparently advance beyond 26° 30′ lat.; probable southern limit long. 21°.	In the same localities as at present.
13. *Strepsiceros kudu.*	Found in the Zulu country, not west of long. 30°, until we get between lat. 26° and 25°.	Common everywhere. A few in Cape colony in the Zuurberg in 1849.

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* In all cases when boundaries are mentioned, Petermann's map of South Africa is referred to.

Name.	Present Distribution.	Past Distribution.
14. *Oreas canna*	A few preserved in Natal. Still found in Zulu Land, but not west of long. 30° until one comes to lat. 24°, or at least but rarely. On the west coast in Damara Land rarely seen so far south as 20°, according to Andersson, 1857.	Common through S. Africa.
15. *Tragelaphus angasi.*	Inhabits the coast-line from the Inyalazi river in Zulu Land, as far north at least as Delagoa Bay.	Probably the same as at present.
16. *Alcelaphus caama.*	In parts of Natal; a few seen in long. 27°, lat. 25°; still a few found in the Zulu country. Its spoor seen in long. 27°, lat. 23°, but apparently getting very rare.	Common everywhere.
17. *A. lunatus*	In the Amaswazi Land, in lat. 27°; common on the Limpopo; beginning in lat. 25°, goes as far west as long. 25°.	First found about Latakoo in lat. 27°, long. 25°, by Dr. Burchell.
18. *A. albifrons*	Western boundary 28° long., eastern the Drakensberg range; an occasional one in winter found in the north of Natal. Probable boundary of its northern range lat. 35° 30′. Principal habitat the open country in the Orange Free State and the south of the Transvaal.	Found sparingly in the colony. In other respects its boundaries were the same as at present.
18a. *A. pygargus* ...	In the Cape colony, in Breida's Farm at Cape L'Agulhaz, apparently the only place in which it is now found.	According to Harris, its limit north appears to have been 25° lat.; but its principal habitat was, according to the same author, the extensive grassy plains south of the Vaal river.
19. *Catoblepas gnu* ...	Not known apparently west of the Drakensberg range of hills; occurs yet through most parts of the Transvaal and Orange Free State in the open country; found again in lat. 22°, from about long. 26°, into Damara Land.	In much the same situations as now, but came much further north.
20. *C. gorgon*...........	Still found in the Zulu country. Does not begin to extend its range west until about lat. 25°.	Apparently never crossed the Vaal river into the colony, but common in all suitable localities to the north of it.
21. *Hippotragus equinus.*	Still found in the Amaswazi Land in lat. 27°; its probable range, besides, is most likely the same as that of the Sable Antelope.	According to Dr. Smith, once found in the old colony; but how far north is not known for certain. Gordon Cumming met with it just to the north of the Vaal river.
22. *H. niger*	Still said to linger on the Magaliesberg, where they were first found by Harris in 1836 or 1837. It probably does not extend further westward than long. 23°, lat. 21°, or further south than lat. 26°, and there only sparingly.	The same as at present.
23. *Oryx capensis*......	A few still preserved at Cape L'Agulhaz, in Cape colony, on Breda's Farm. At present its furthest range east seems to be long. 27° nearly, yet found as far north as lat. 24°.	Found commonly in the Cape colony, but probably never further east than its present limit, being more of a western animal; or probably that part of the country was more suited to its habits.
24. *Bubalus caffer* ...	About lat. 28° in Zulu Land; a few still preserved in Natal, in those places not extending beyond 30° E. long. Begin to extend their range west about the Tropic of Capricorn.	Common through all S. Africa.
25. *Camelopardalis giraffa.*	On the east coast about lat. 25°, which is the probable latitude through S. Africa	About lat. 28°, to the west of long. 24°. The Giraffe probably never crossed the Orange River to the south.

In this Table, when latitude and longitude are mentioned, south latitude and east longitude are to be understood. When a species is stated to be common everywhere, suitable localities must be understood.

I have endeavoured to make this Table as accurate as possible; but there is little very recent information of the south-west parts, Baines's 'Explorations' in 1862 being the latest.

There is also no information to be got of the great Kalahari Desert, whither I believe many animals go during the rainy season, and where they are comparatively safe from pursuit, except from the Bushmen.

I have taken lat. 18° as my northern limit of S. Africa.

The following list of the specimens which I sent home, and which are now in the Museum of Zoology and Comparative Anatomy of the University of Cambridge, has been drawn up by J. W. Clark, M.A., F.Z.S., Superintendent of the Museum.

CAPE BUFFALO (*Bubalus caffer*), ♂, skeleton.

WATER-BUCK (*Cobus ellipsiprymnus*), ♂, skeleton. An unusually fine skeleton, with skin, of a completely adult animal.

ROAN ANTELOPE (*Hippotragus equinus*), ♂, skeleton, with skin.

IMPALLA (*Æpyceros melampus*), ♂, skeleton. The skeleton is of a very old animal. With it were sent a skin, also of a male, and a skin of a female.

BRINDLED GNU or BLUE WILDEBEEST (*Catoblepas gorgon*), ♂, skeleton, adult.

SASSABYE or BASTARD HARTEBEEST (*Alcelaphus lunatus*), ♂, skeleton.

KOODOO (*Strepsiceros kudu*), ♂, skeleton.

ELAND (*Oreas canna*), ♂, skeleton.

INYALA (*Tragelaphus angasii*), ♀, skin.

BURCHELL'S ZEBRA (*Equus burchellii*), skeleton, with skin.

LION (*Felis leo*), ♀, skeleton.

SPOTTED HYÆNA (*Hyæna crocuta*), ♂, skeleton.

SILVER JACKAL (*Canis mesomelas*), 2 skeletons, with skins.

BUSH-BABY (*Galago maholi*), skeleton.

3. Notes on Entozoa.—Part IV. By T. Spencer Cobbold, M.D., F.R.S., F.L.S., Correspondent of the Academy of Sciences of Philadelphia.

[Received February 14, 1876.]

(Plate XXI.)

The present series comprises a variety of new and interesting parasites, all of them belonging to the Nematode Order.

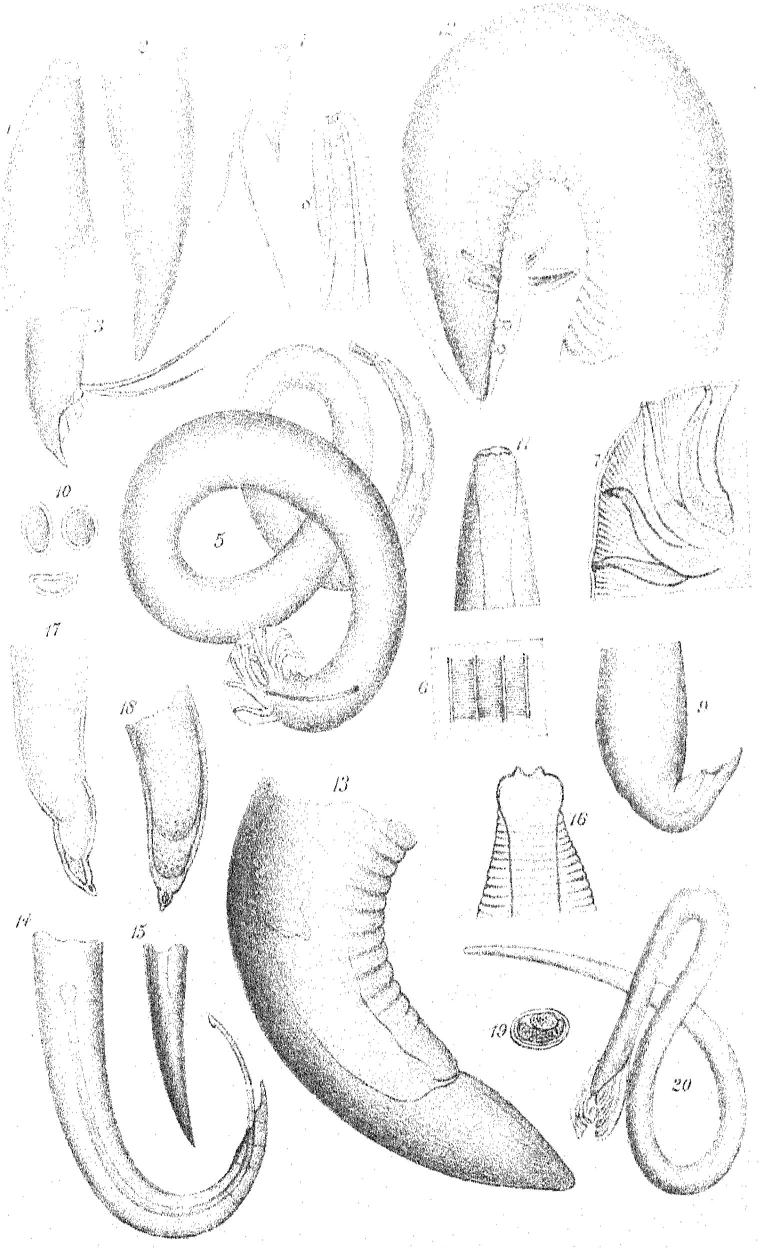
12. Ascaris cornelyi, nov. sp. (Plate XXI.)

On the 21st of December, 1875, I was requested to identify a nematoid which Mr. Sclater had only a few days previously received from Mr. J. M. Cornély, C.M.Z.S. As stated on the label of the bottle, the worms had been removed from the intestines of a Vulturine Pintado (*Numida vulturina*). At once making a pocket-lens examination of the parasites, I remarked that the species was probably new to science; and on the 30th of the same month this opinion was confirmed by careful investigation. In a more or less marked manner its characters differed from allied forms infesting fowls and game birds (such as *Ascaris compar*, *A. perspicilla*, *A. inflexa*, &c.); consequently I have ventured to name the worm *A. cornelyi*, after the discoverer. The bottle contained eleven specimens in all, eight of them being of the male sex. I think the worms must have been unduly shaken during transmission; for not only were they coiled together in a very complicated way, but at least three of the males had their exserted spicules broken. From the best examples I gathered the following diagnostic characters:—Head entirely naked and destitute of appendages, the dorsal lip being conspicuously larger than either of the two ventral lips; body much contorted and rather suddenly narrowed at either end, especially towards the head in the female; tail of the male appearing diagonally abrupt when seen in profile, and furnished with a sharply pointed subulate process at the tip, also presenting on either side a feebly developed but distinctly four-lobed membrane; spicules two in number, long and slender, unequal, the exserted portion of the longer one measuring fully $\frac{1}{18}$ of an inch; tail of the female with an ensiform profile, sharply pointed and furnished with an extremely minute, distinct but scarcely separable process at the tip. Males up to $\frac{3}{4}$ of an inch in length, the females being very nearly an inch long, with a breadth of $\frac{1}{15}$ of an inch.

Of the accompanying figures, two of them illustrate the characters of the head and tail of a female worm, whilst the others show respectively right and left profile views of the tail of the male as exhibited by the two most perfect specimens (Plate XXI. figs. 1–4). The arrangement of the spicules in the fourth figure is clearly the result of artificial twisting.

13. Strongylus hemicolor, nov. sp. (Plate XXI.)

Nearly ten years back I received a batch of parasites from the



T.S.C. del. J.Smit lith.

M & N. Hanhart imp.

NEW OR RARE ENTOZOA.

Zoological Gardens. Some of these have been described in the Society's 'Proceedings;' and others have been publicly noticed elsewhere in a less formal manner.

Amongst the series in question was a bottle that contained three different species of nematoid parasites, all derived from one and the same host. The infested animal was a Lemur (*Pithecia leucocephala*) which appears to have died at the Gardens on the 28th of June, 1866. The worms were of three well-marked sizes. The largest species, represented by a single parasite and measuring $8\frac{1}{2}$ inches long, could not be distinguished from the ordinary *Ascaris lumbricoides* of the human subject. It had been removed by Dr. Murie from the rectum.

The worms of intermediate size, numbering in all eleven specimens, were taken from the stomach and œsophagus; six of these were males averaging from an inch to an inch and a quarter in length. The five females varied from $1\frac{1}{2}''$ to $2''$ in length. A pocket-lens examination at first suggested that they were examples of *Spiroptera dilatata* (a species that is common in the South-American Monkeys); but I have since determined otherwise. The smallest set of parasitic worms from the Lemur, of which there were no less than forty-four specimens in the bottle, proved to be new to science. These had been removed from the small intestine. In the condition in which I received them they were each thrice or four times coiled upon themselves, reminding one of the appearance so often seen in the encapsuled nematodes of fishes. After my original brief examinations, I put all the worms aside for future study; and it was not until the 16th of April, 1873, that I found the necessary leisure to work out the general structure of these elegant little parasites. Their minute size rendered them eminently favourable for microscopic examination; and in this way I obtained evidence of the existence of several peculiarities that I had not hitherto encountered amongst the nematodes. The following characters will form a ready means of identification:—Head well marked and furnished with a transversely striated bilateral membrane which projects beyond and contributes to the formation of the mouth; oral aperture simple and continuous with a long and moderately narrow œsophagus; body decidedly attenuated in front and almost uniformly thickened behind, its surface being marked by 12 or 14 conspicuous lines, forming in profile slightly raised parallel ridges extending from one end to the other; tail of the female suddenly narrowed to a conical point, the arms being placed within a very short distance of its extremity; tail of the male furnished with a large circular and apparently undivided hood, supported by ten rays; spicule solitary and rather long. Males only $\frac{1}{5}$, and females only $\frac{1}{4}$ of an inch in length.

In addition to the above diagnosis I may add that I have named the species *hemicolor*, from the circumstance that the anterior half of the body in nearly all the specimens was a shade darker in colour than the posterior half. I have illustrated the structure of the worm by five figures. One of these affords a general view of the male parasite naturally coiled upon itself (Plate XXI. fig. 5). The longitudinal lines are not represented here; but they are separately shown in figure 6, where the quarter-inch glass also brought into view numerous transverse striæ between the ridges. Alterations of the focus, however, served to show that the transverse lines were continuous and not interrupted by the longitudinal lines. I am under the impression that these lines are due to the presence of water-vascular canals, but could not demonstrate the existence of a lumen with certainty. Another illustration shows part of the bursa highly magnified (fig. 7). The tubular character of the rays, with their finely granular contents, was well seen, the bursal membrane being itself marked by a series of perfectly distinct striæ radiating from the base to the outspread margin, the latter being distinctly bordered by a thin extension of the cuticular layer. In another drawing I have represented an enlarged view of the head of the male (fig. 8); and I have also given (fig. 9) a less magnified view of the tail of the female.

14. Spiroptera muriei, nov. sp. (Plate XXI.)

The eleven nematodes above mentioned as being of intermediate size I have also determined to be new to science. As already stated, they were removed by Dr. Murie from the stomach and and œsophagus of the Lemur (*Pithecia leucocephala*). The following characters will be sufficiently diagnostic in view of future identifications:—Head simple and unarmed, the mouth being bordered by six very slightly elevated papillæ; body uniform in thickness, but suddenly narrowed at either end, both sexes presenting a conspicuous gland opening at the ventral surface, about $\frac{1}{20}$ of an inch below the oral margin; tail of the male strongly curved, sharply pointed, and furnished with broad lateral folds, each about $\frac{1}{16}''$ in length; spicules two, scimitar-shaped, remarkably stout and short, the larger measuring not more than $\frac{1}{30}''$ lengthways; tail of the female comparatively blunt, the anus being placed about $\frac{1}{24}''$ from the tip. Males up to $1\frac{1}{4}''$; females $1\frac{1}{2}''$ to $2''$ long.

The accompanying Plate (figs. 11–13) supplies three illustrations of this worm, showing all the more essential characters above described, and likewise, in addition, the presence of a supplementary caudal appendage in the male, besides several stalked gland-ducts connected with the lateral membranes.

15. Ascaris andersoni, nov. sp. (Plate XXI.)

On the 27th of September, 1875, I received a small parcel containing entozoa from Dr. John Anderson; and I was informed by letter that all the parasites had been obtained by the donor from hosts occupying the north-eastern province of India.

In the series in question there were six examples of a small nematode removed from the cæcum of a squirrel (*Sciurus* —— ?). Two of the specimens were males, four being females. Believing them to represent a new species, I append the following diagnostic characters:—Head simple, unarmed; body finely drawn out in front and sharply pointed behind in both sexes; tail of the male furnished with a minute oval-shaped spine at the tip, also with two long arcuate spicules slightly winged at the extremity; tail of the female with the terminal spine continuous and scarcely distinct. Males measuring up to $\frac{1}{2}''$ in length; females to $\frac{3}{4}''$ long, with a thickness of $\frac{1}{25}''$ at the widest part.

I have given two illustrations representing the tails of either sex (figs. 14 and 15). The profile view shows but one spiculum, the other being concealed by its side. I could not find the situation of the reproductive opening in the female. The uterine branches were filled with nearly spherical ova, measuring from $\frac{1}{500}''$ to $\frac{1}{400}''$ from pole to pole. The more advanced in development contained coiled embryos.

16. Ascaris simplex, Rud.

Dr. John Anderson's small but interesting collection of parasites also showed four characteristic specimens of this species. They had been obtained by the donor from the intestines of the Dolphin of the Ganges (*Platanista gangetica*). Singular to say, all the examples were of the female sex, the two largest measuring about $1\frac{3}{8}''$ from head to tail. The smaller worms did not either of them exceed one inch in length. In connexion with these specimens, all of which were carefully examined by me on the 28th of last September, I have only to add that they presented the peculiarly flexed state of the chylous intestine or stomach as described by Dujardin. As that distinguished helminthologist had already accurately surmised, the *Ascaris delphini* of Rudolphi must clearly be regarded as identical with this species.

17. Ascaris leptura, Rud.

In addition to the above-described species, Dr. Anderson's collection also shows three specimens of a small nematode taken from the intestine and cloaca of a tortoise (*Testudo elongata*). Two of them are of the male sex, measuring a trifle over half an inch, the female being nearly three quarters of an inch long.

18. Oxyuris obesa, Diesing. (Plate XXI.)

In the collection of entozoa which I received from Mr. Charles Darwin, F.R.S., in the month of August, 1862, there were five specimens of this nematode. Unfortunately Mr. Darwin's MS. has been mislaid. I have little doubt, however, that these parasites were obtained from the intestinal canal of a Capybara in the year 1832. All the worms were females, their heads displaying six very conspicuous papillæ, three of which I have represented in profile in the accompanying Plate (fig. 16). The point of the tail varied so considerably in form that I have added representations of it from two specimens. The extremity was in all cases marked by the presence of a small conical transparent process, the centre of which showed a distinct cavity containing fine granules (figs. 17 and 18). The eggs have a long, oval, almost elliptical form, some of them exhibiting a finely sculptured external envelope. Three membranes were distinctly visible (fig. 19). Some of them showed a distinct separation of the yelk-contents into two masses, the smaller division being finely granular, whilst the larger mass was formed of moderate-sized corpuscles like those usually seen in the so-called mulberry-cleavage stage.

19. Strongylus tubæformis, Zeder. (Plate XXI.)

In the small collection of parasites presented to me many years ago by Mr. Caleb B. Rose, F.R.C.S., I only recently noticed a little nematoid which is clearly referable to this species. It was entangled amongst a number of characteristic examples of *Ascaris mystax* of the Cat, and had consequently been overlooked. Being a solitary male specimen (since added to the special series of Entozoa contained in the Museum of the Royal Veterinary College), I did not make a very full examination of the worm; but on referring to my notes made on the 3rd of December last, I find that I have remarked upon the great size of the bursa, the rays of which were very conspicuous. I did not uncoil the specimen (represented in the accompanying Plate exactly as it appeared under Ross's $\frac{1}{2}''$ objective), for fear of injuring it; but I judged the length to be about $\frac{5}{8}$ of an inch. As it is the only specimen that has come under my notice, I have figured it (fig. 20).

EXPLANATION OF PLATE XXI.

Fig. 1. *Ascaris cornelyi*: head of female, magn. 20 diam.
2. The same: tail of female, magn. 24 diam.
3. The same: tail of male, magn. 25 diam.
4. The same: tail of a rather smaller male.
5. *Strongylus hemicolor*: male, magn. 30 diam.
6. The same: section of surface, magn. 150 diam.
7. The same: part of bursa, magn. 150 diam.
8. The same: head of male, magn. 150 diam.
9. The same: tail of female, magn. 30 diam.
10. The same: three eggs, magn. 150 diam.
11. *Spiroptera muricei*: head of male, magn. 30 diam.
12. The same: tail of male, magn. 30 diam.
13. The same: tail of female, magn. 30 diam.
14. *Ascaris andersoni*: tail of male, magn. 25 diam.
15. The same: tail of female. magn. 25 diam.
16. *Oxyuris obesa*: head of female, magn. 23 diam.
17. The same: tail of female, magn. 24 diam.
18. The same: tail of another female.
19. The same: egg, magn. 122 diam.
20. *Strongylus tubæformis*: male, magn. 23 diam.

4. Supplementary Notes on *Cervus mesopotamicus*.

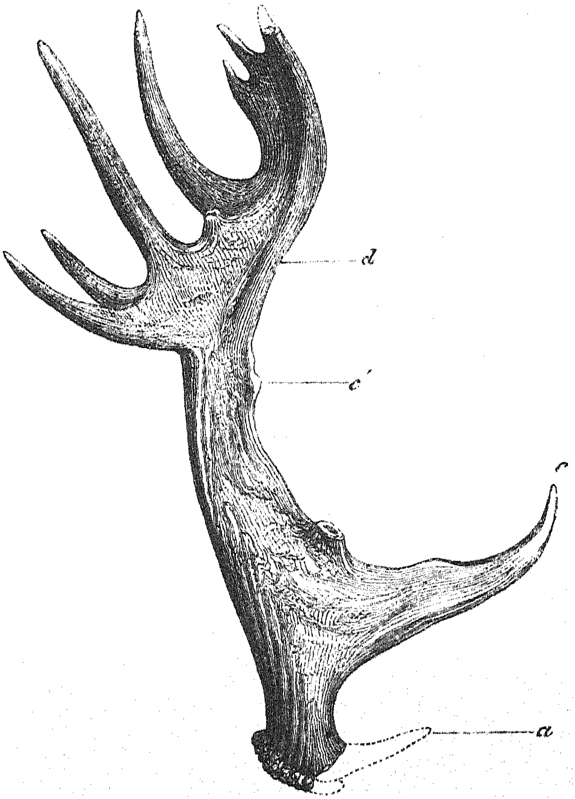
By Sir Victor Brooke, Bart., F.Z.S.

[Received January 19, 1876.]

Having lately received from my indefatigable correspondent Mr. Robertson, H.B.M. Vice-Consul at Busrah, several fresh specimens of the horns of *Cervus mesopotamicus* (*vide* P. Z. S. 1875, p. 261, pl. 38), I hasten to lay before the Society some additional observations which these specimens have enabled me to make upon this interesting species.

The accompanying drawings, lettered according to the figures given in my original notice of the species (*l. c.* pp. 263 & 264, figs. 2 & 3) represent the left horns of four individuals; and all, with the exception of the largest (fig. 1), have been taken from the animals after death. As compared with the single horn of the adult male (*l. c.* p. 264, fig. 3.) which formed the basis of my description of the fully grown horns of the species, the horns at present under consideration offer no very essential points of contrast, the characters presented by the new specimens in no way tending to render the anomalous form of horn described by me as characteristic of the species, less decided. There are, however, certain not entirely unimportant details in which the new specimens (consisting of single horns of six distinct males, in-

Fig. 1.

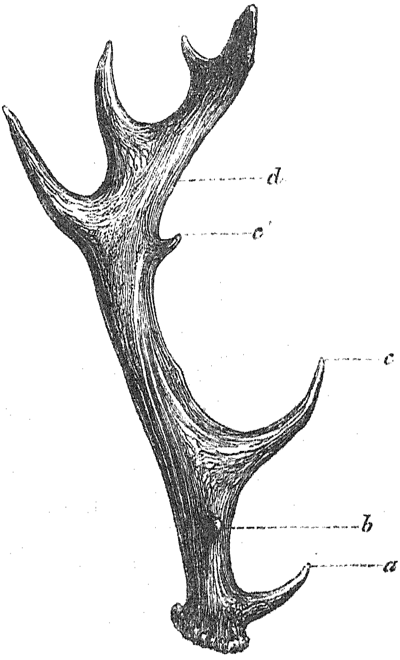


Left antler of *Cervus mesopotamicus* (remarkably largely developed).

clusive of those figured) agree together, while they differ from the specimen first received; a slight modification of my original diagnosis appears to me to be therefore necessary.

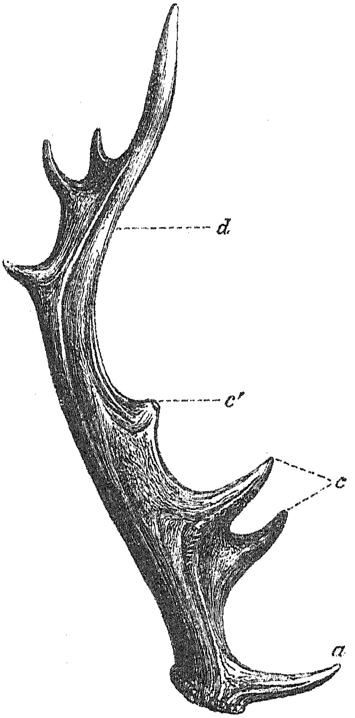
With one exception (fig. 2), in none of the horns lately sent by Mr. Robertson is the inner tine *b* (*l. c.* p. 264, fig. 3 *b*) developed, from which I am led to believe that this tine is of uncertain occurrence, and does not by any means constitute a fundamental specific character. Again, with but one exception (fig. 3 *c*), in none of the new specimens is the upper of the two tines (*l. c.* p. 264, fig. 3, *c*) which projects from the anterior aspect of the palmated portion of the horn any thing more than a mere rudiment; in some it is entirely absent. Instead of being subcylindrical, as was the case with the beam of the old type specimen, the beams of all the new specimens are very decidedly compressed anteriorly, forming, in the more adult, a sharp ridge from which are, not unfrequently, developed blunt rudimentary tines (*c*′, figs. 1, 2, 3, 4). In the finest horn sent by Mr. Robertson the upper third of the beam is furnished with eight strong tines, some of which are upwards of 7″ in length (fig. 1 *d*); and even in the horns belonging to younger animals (figs. 2 & 3) these coronal tines

Fig. 2.



Left horn of *Cervus mesopotamicus* (about four years of age).

Fig. 3.



Left horn of *Cervus mesopotamicus* (about four years of age).

appear to be generally more numerous than was indicated by the old specimens.

These facts considered, the following diagnosis of the specific characters of the horns of *Cervus mesopotamicus* will, I think, be found more perfect than that given in my first notice of the species.

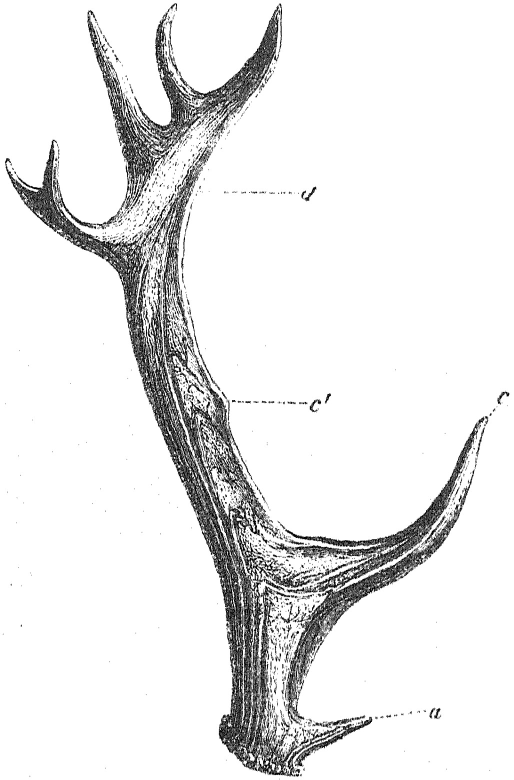
CERVUS MESOPOTAMICUS.

Horns, adult male.—Each horn supported on a short pedicle, its base surrounded by a massive well-developed burr, immediately above which a short straight brow-antler projects forwards and slightly upwards (*a*, figs. 1–4).

Expanding gradually from the burr, a more or less distinct fan-shaped palm is formed, from the anterior aspect of which are given off one or two laterally compressed, powerful tines (*c*, figs. 1–4, & *l. c.* figs. 2 & 3).

Above the palm the horn is contracted into a short beam rounded posteriorly, but with its anterior surface laterally compressed into a sharp ridge, from which blunt rudimentary tines are occasionally developed (c', figs. 1–4). From the posterior surface of the upper third of the beam arises a row of long subcylindrical tines, from 3 to 8 in number, the bases of which, in very strongly developed specimens (fig. 1), are united so as to form a second palmature. The lower three fourths of the beam are bent in a decided curve outwards and slightly downwards, the upper fourth abruptly inwards and upwards.

Fig. 4.



Left horn of *Cervus mesopotamicus* (adult and of typical form).

From the following extract of a letter which I received from Mr. Robertson a short time since, it will be seen that I have been somewhat unfortunate in the name chosen for this species; as, however, the name *C. mesopotamicus* has been published, I believe I shall be taking the course least conducive to future confusion in adhering to it: Mr. Robertson writes:—

"I am very glad to see by your letter received some days ago, that the horns have enabled you to decide about the spotted deer. I fear, however, that I did not clearly explain that this deer is met with in no part of Arabia, except in the jungles bordering the river Karoon and its tributary the Diz, both of which issue from the hitherto unexplored Luristan Hills. It does not exist in Mesopotamia or anywhere near the Euphrates; and the name *Cervus mesopotamicus* seems therefore to be a little misleading. I suspect, indeed, that this deer is really a native of the Luristan Hills, and that those I occasionally meet with on the Karoon are a few which wander down along it in the dry season. It is certain that there are more of them on the Karoon during the hot months than in winter. I have got a few horns from Luristan and some Gazelles' skulls from various parts of Arabia, which I shall send you by the first opportunity. Natives tell me the Luristan Hills abound in wild sheep and deer of various kinds. I should like much to visit them; but the inhabitants are predatory and fanatical, and if one wished, as I should, to leave the caravan-route, and explore the hills, a stronger party than I could conveniently muster would be necessary. I went twice to the Karoon last winter, but saw no deer on either occasion. Lions were plentiful, and other kinds of game consequently scarce, I hope to be more fortunate next season."

Busreh, May 30, 1875.

The table, which I here append, of some comparative cranial measurements of *Cervus mesopotamicus* and *Cervus dama** will, I trust, be of service in the determination of the species.

	Cervus mesopotamicus.		*Cervus dama.*	
	inches.	metre.	inches.	metre.
Greatest length of skull in a straight line	12·3	0·313	11·1	0·282
Distance from anterior rim of orbit to free extremity of the præmaxillæ	6·5	0·165	5·9	0·150
Distance from anterior extremity of nasals to free extremity of præmaxillæ	2·7	0·069	2·2	0·056
Width between the orbits.	4·6	0·117	4·1	0·104
Width of upper extremity of the nasals between the anteorbital vacuities	2·9	0·074	1·8	0·046
Distance from lower rim of orbit to maxillomalar suture	1·15	0·028	·6	0·016
Distance from maxillomalar suture to alveolus of posterior molar ...	·9	0·023	1·1	0·027
Extent of upper premolar series	1·55	0·039	1·35	0·034
Extent of upper molar series	2·1	0·053	1·9	0·048

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* The measurements of *Cervus dama* are taken from an unusually large outlying Buck.

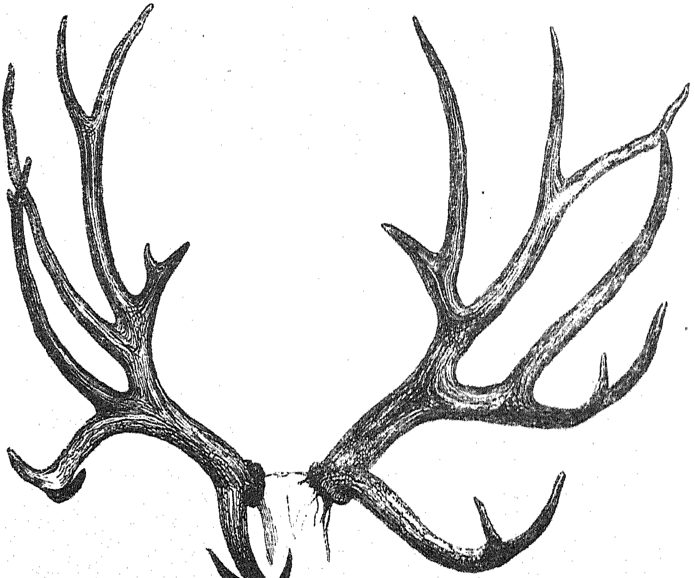
5. On *Cervus schomburgki* (Blyth).

By Sir Victor Brooke, Bart., F.Z.S.

[Received February 11, 1876.]

No fresh information of any consequence having been added to our knowledge of *Cervus schomburgki* since Mr. Blyth's original notice of the species (P. Z. S. 1863, p. 155, and 1867, p. 835), I have thought the following details and specific diagnosis, based on specimens which I recently received from Siam, and on an adult stag mounted in the gallery of the Muséum d'Histoire Naturelle at Paris, worthy of the Society's notice. For the Siamese specimens, which consist of the frontlet and horns of a remarkably fine old male, and a pair of loose horns of abnormal and very interesting growth, I am indebted to the kindness of Dr. Campbell, late resident medical officer of the British Consulate at Bangkok. Respecting the locality from which the specimens were obtained, Dr. Campbell writes, "in reply to your queries, I believe that all the specimens were procured in Northern Siam, probably even in the tributary States named Laos or Shan." The horns of the normal specimen (fig. 1), which are of very vigorous growth, possessing 20 distinct points, present all the characters described by Mr. Blyth as typical of the horns of

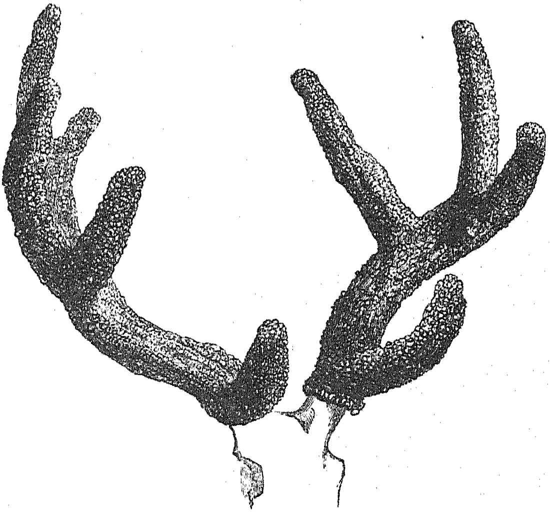
Fig. 1.



Normal antlers of *C. schomburgki.*

this fine species. The entire external surface of the abnormal horns (fig. 2) is covered with dense nodular exostosis, intersected by deep furrows, which adds greatly to their circumference, and gives to the extremities of the tines a blunt rounded outline. A section through the centre of one of the tines shows no line of demarcation between the external and internal portions of the horn, the same remarkable density pervading the whole; hence the very great weight of the horns, which is nearly double that of the normal pair.

Fig. 2.



Abnormal antlers of *C. schomburgki.*

There can, I think, be no doubt that this abnormal condition has been the result of injury to the testes of the deer to whom these horns belonged—many specimens, affected by a similar exostosis, which exist in my own and public collections having been the direct result of castration. Though much still remains to be ascertained by carefully conducted experiment and observation before an exact and exhaustive knowledge of the effects of injuries to the testes of deer upon their antlers can be obtained, the three following propositions may, I think, be considered as resting upon a moderately firm basis.

(1) If a deer is perfectly castrated within the first six months of his life, no antlers are ever developed. (2) If castrated during the growth of his antlers, their growth in a natural direction is immediately arrested, and the velvet is retained during life, the horns frequently assuming very varied monstrous forms. (3) The castration of a deer with fully grown antlers free from velvet, causes the premature fall of these antlers, which are immediately replaced by a pair of antlers of normal or subnormal external outline and dimen-

sions, which remain, with their velvety periosteum, persistent during the remainder of the animal's life. The two former of these propositions I have myself verified by experiment; the third I must, for the present, take upon the authority of former experimenters*, and upon the assurance of Mr. Sawyer, Head Keeper of the Royal Park at Richmond, who, some years ago, informed me that he had very frequently tried this experiment for himself and invariably with the same result.

From the almost perfectly normal outline and dimensions of these abnormal horns of *Cervus schomburgki* it is, I think, evident that they are referable to a deer castrated whilst in "hard horn." Their exostosed superficial surface, in which their abnormality consists, is accounted for by the supposition that the velvety periosteum being in full connexion (as it was possibly for some years) with the circulatory system, continued to perform, probably in a sluggish and irregular manner, its proper physiological function, the deposit of osseous matter, thus giving rise to a slowly increasing exostosis, in which the external arterial and venal canals became more and more deeply imbedded. At the same time the great density and weight of the horns seems to indicate that this external deposit of osseous matter was accompanied by an internal deposit which gradually obliterated the cancellous tissue of the centre of the horn.

The form of horns described as characteristic of *Cervus schomburgki* in the following diagnosis is based on the examination of numerous specimens, including the types; the external coloration and body-measurements upon the adult male specimen preserved in the Muséum d'Histoire Naturelle at Paris. This specimen was sent by M. Bocourt from Siam in 1868, and is that mentioned by Mr. Blyth (P. Z. S. 1867, p. 835), and later by Mr. Sclater (Trans. Z. S. vol. vii. p. 349).

The comparative measurements of *Cervus schomburgki*, *Cervus duvaucelli* (Cuv.), and *Cervus eldi* (auct. anon.) are taken from the frontlet and horns of the adult male *Cervus schomburgki* (fig. 1) above mentioned and from very fine skulls of *Cervus duvaucelli* and *Cervus eldi* in my own collection.

CERVUS SCHOMBURGKI (Blyth).

Adult male.—Antlers with very long powerful brow-antlers, which are frequently forked; beam very short, and more or less laterally compressed, upper part of the antlers strictly dichotomous, each of the main branches about equally developed, and in itself dichotomous, and furnished with long cylindrical tines. External surface of the antlers smooth and polished. Hair in winter rather long and coarse. General colour uniform brown, darkest on the nose and upper surface of the tail, and lightest on the cheeks and lower parts of the sides and haunches. Lower lip, belly, and under surface of the tail whitish. Upper lip, occiput, and limbs with a decided tinge of rufous. The hair on the front of the metacarpal cannon bones is lengthened into an everted mane about 2 inches in length.

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* See a curious old work to which Prof. Rolleston has lately called my attention, entitled 'The Economy of Nature in Acute and Chronical Diseases of the Glands,' by Dr. Richard Russell (pp. 21–24).

Immature male.—Antlers with the posterior of the two main branches less developed than the anterior branch.

Female. Unknown.

Hab. Northern parts of Siam.

	Cervus schomburgki.	*Cervus duvaucelli.*	*Cervus eldi.*
	inches.	inches.	inches.
Height at shoulder	41	43	32
Length of ear	6·5	7	
Width of ear	3·8	3·5	
Length of tail, exclusive of hair	4	5	
Length of beam from burr to fork	8	17	
Length of longest tine on anterior branch of fork	16	13	
Length of longest tine on posterior branch of fork	17	11·5	
Greatest span of coronal tines	22·2	18	
Length of brow-antlers	17·5	14·7	10
Total length of skull	....	15·4	13
From free extremity of præmaxillæ to tip of nasals	....	3·3	2·6
From ditto to anterior rim of orbit	....	8·2	6·9
Extent of upper premolars	....	1·9	1·35
Extent of upper molars	....	2·6	1·85
Extent of lower premolars	....	1·8	1·3
Extent of lower molars	....	2·9	2·15

March 21, 1876.

Dr. E. Hamilton, V.P., in the Chair.

Mr. Sclater exhibited a series of skins of the Parrots of the Fiji Islands, obtained by Mr. E. L. Layard, F.Z.S., and belonging to Lord Walden's Collection. Mr. Sclater called special attention to a new species of the genus *Pyrrhulopsis* of Reichenbach, from the island of Taviuni, which Mr. Layard proposed to call *taviunensis*, represented by several specimens. This species had nearly the same purplish red colour as *P. tabuensis* (sive *atrigularis*, Peale), of which a fine specimen was living in the Society's Gardens—but was readily distinguishable by the total absence of the blue nuchal collar. Referring to his former remarks on this subject (P. Z. S. 1864, p. 158), Mr. Sclater pointed out that the special habitat of four species of this group of Parrots had now been ascertained, and showed them on a chart of the Fiji group. These were:—

1. P. ATRIGULARIS (Peale): Ngau Island (*Rayner*).

2. P. TAVIUNENSIS, Layard: Taviuni (*Layard*).

3. P. SPLENDENS (Peale): Kandavu and Viti Levu (*Layard*).

4. P. PERSONATA (G. R. Gray): Kandavu (*Layard*).

It seemed now quite certain, from the researches of Dr. E. Gräffe (*cf.* J. f. O. 1870, p. 416), that the true *P. tabuensis* was found in the Tonga group, not, indeed, on the island of Tongatabu, but on the adjoining island of Eua or Eoua of that group. Mr. Sclater was therefore not yet quite convinced, in spite of what Messrs. Finsch and Hartlaub had stated (J. f. Orn. 1870, p. 123), that Peale's *P. atrigularis* (which he had identified, P. Z. S. 1864, p. 158, as applicable to Mr. Rayner's specimen from Ngau Island, Feejees) was certainly = *P. tabuensis*, unless, indeed, it should turn out that *P. tabuensis* had been introduced by the natives of the Tonga Islands from the Feejee group *.

The following papers were read:—

1. Descriptions of Lepidoptera from the Collection of Lieut. Howland Roberts. By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

[Received February 21, 1876.]

(Plate XXII.)

The first two species here described were lent to me by Lieut. Roberts soon after his arrival in England; but press of work has prevented me from determining their affinities until now.

Family ERYCINIDÆ.

STIBOGES, n. gen.

Allied to *Abisara*, aspect of *Nymphidium*.

Wings with rounded outer margin broad, costal nervure of primaries terminating abruptly at about the middle of the costa, opposite to the end of the discoidal cell, subcostal with five branches, the last two forking to apex; upper radial emitted from the inferior margin of the subcostal near its origin; lower radial nearly equally dividing the discocellulars, which are concave; second and third median branches emitted near together; precostal of secondaries short, oblique, directed backwards; costal nervure short, straight, oblique, terminating at basal third of costa; subcostal forking beyond the end of cell, the upper fork running close to the margin from the second third of costa; radial emitted close to the subcostal, reducing the upper discocellular to a point; lower discocellular long, oblique, nearly straight; second and third median branches emitted nearer together than the first and second; body slender; eyes prominent; antennæ slender, submoniliform; palpi very small. Type *Stiboges nymphidia*, n. sp.

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* Mr. Salvin kindly sends me an extract from the "Voyage in search of La Perouse" (translated from the French, 2 vols. 8vo, 1800) in illustration of this point. "On the morning of the 26th March we landed (on Tongataboo). . . . They (the natives) sold us several birds; among others a charming species of Lory, which they assured us had been brought them from Fidgi."—*Tom. cit.* ii. p. 105.—P. L. S.

1. Stiboges nymphidia, n. sp. (Plate XXII. fig. 1.)

Wings semitransparent, snow-white; primaries with broad costal and external dark-brown borders, sinuated internally; two irregular submarginal series of unequal white spots; secondaries with a broad outer border, undulated internally; a sinuated disco-submarginal lunulated pale brown line; a submarginal series of elongated white spots; body dark brown; wings below as above; legs, palpi, and venter white. Expanse of wings 1 inch 9 lines.

Pinang (*Roberts*).

Family Ægeriidæ.

Genus Sura.

2. Sura chalybea, n. sp. (Plate XXII. fig. 4.)

Wings bright metallic steel-blue, becoming purple towards the outer margin; body purplish black; legs and anal tufts black-brown; antennæ black-brown. Expanse of wings 1 inch 9 lines.

Singapore (*Roberts*).

Family Sphingidæ.

Subfamily Macroglossinæ.

Genus Macroglossa.

3. Macroglossa obscuriceps, n. sp. (Plate XXII. fig. 5.)

Wings purplish black, primaries crossed near the middle by a broad ill-defined regular greyish band, bounded on each side by two velvety-black parallel lines; two scarcely visible waved discal lines; secondaries with the costal area creamy-ochreous; interno-median area crossed obliquely by a streak of dull ochreous hairs; body above ferruginous; head and antennæ dull black; segments of abdomen with lateral anterior piceous spots, the second and third segments with posterior lateral ochreous spots, the fourth to sixth segments with lateral white-tipped tufts; fifth segment blackish, especially at the sides; anal tuft black, tipped with ferruginous; wings below ferruginous, outer borders blackish, base ochraceous; a central transverse dark brown line; abdominal area of secondaries ochreous; palpi white; pectus sordid whitish, brownish at the sides; venter ferruginous, with central triangular testaceous patches; tufts as above. Expanse of wings 2 inches 3 lines.

Ayerpanas, Malacca (*Roberts*).

This is one of the best-marked of the species of *Macroglossa*.

Genus LOPHURA.

4. LOPHURA MINIMA, n. sp. (Plate XXII. fig. 2.)

Primaries above grey, apical area broadly purplish brown, crossed by a dark brown discal line, and bounded internally by a triangular subcostal blackish spot; base brownish; two black spots on inner margin; secondaries tawny, with broad ferruginous external border; head and thorax grey, abdomen rosy greyish, dorsal region dark; wings below dull tawny, powdered, especially towards the outer margins, with grey; secondaries with a black-edged white dot at end of cell; anal angle, and two parallel central transverse lines, ferruginous; body below rosy greyish, back of pectus whitish. Expanse of wings 1 inch 1 line.

Ayerpanas, Malacca (*Roberts*).

Subfamily SMERINTHINÆ.

Genus MIMAS.

5. MIMAS TERRANEA, n. sp. (Plate XXII. fig. 3.)

Primaries greyish clay-brown, crossed by two central diffused reddish bands; a dull black dot at end of cell; several dark grey discal spots towards apex; secondaries dark brick-red; body greyish clay-brown; antennæ and lateral tufts on metathorax reddish; wings below rosy greyish; primaries with the discoidal cell and interno-median area ferruginous; a straight transverse discal brown line from costa to inner margin: secondaries with an elongated cuneiform ferruginous abdominal streak; two central parallel brown lines; fringe yellowish; body rosy greyish. Expanse of wings 3 inches 2 lines.

Ayerpanas, Malacca (*Roberts*).

A very well marked and distinct species.

2. Corrections of and Additions to "Raptorial Birds of North-western India."—Part II.* By ANDREW ANDERSON, F.Z.S. &c.

[Received February 22, 1876.]

(Plate XXIII.)

Another collecting-season enables me to add the following novelties and additional information on the subject of my last paper, thus bringing up the number of Raptorial Birds occurring in the plains of the North-western Provinces to no less than fifty-two species.

Additions to former lists are indicated by an asterisk.

2. VULTUR CALVUS, Scop.

In allusion to my having found *Gyps bengalensis* resting on palm-trees, I have now to mention that on the 28th January last I saw a pair of King Vultures building on a solitary tar-tree (*Borassus fla-*

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* For Part I. see P. Z. S. 1875, page 16.

belliformis). One bird invariably remained in the nest, sorting the materials as they were brought by its mate.

*12. FALCO BABYLONICUS, Gurney. (Plate XXIII.).

This was *the* prize of the season; and I believe the present example is the finest extant, both as regards maturity and beauty. I shot this specimen in the Etawah district, on the 27th November, while seated on the top of a low babool tree. It allowed me to ride sufficiently close up to it to enable me to distinguish its rufous head and the warm reddish hue of the underparts, which are *the* tests of the fully matured *Falco babylonicus*. At first it occurred to me that it was only a *Lithofalco chicquera*; but its superior size soon dispelled my doubts; and a minute later, as the lovely bird hung by its claws head downwards, bleeding profusely through the mouth, I saw that it was a fine example of the present species.

The specimen now before me (a male) appears to be in *full mature* dress. Carefully measured in the flesh, the following are the results:—Length 14·7; wing 10·7; tail from vent 6·0; tarsus 1·6; bill straight (including cere) 1·0, along the curve (as above) 1·1, width at gape 1·1; greatest expanse of foot—length 4·0, breadth 3·6, centre toe and claw 2·5; weight 1 lb. 6 oz.; the wings fall short of the tail by 1·1.

The cere, gape, and orbital space were *bright* yellow; the bill was pale blue, darkening gradually towards the tip, which was blue-black; the irides were dark brown; and the claws were horny black.

The crop contained the remains of a Lark or Pipit. The Falcon was in full enjoyment of repose after having made a good meal, and was quite unconscious of any approaching danger: I have seldom had a better opportunity of examining a bird of the kind at such close quarters before.

The figure in 'The Ibis' for 1861, p. 217, does not represent a fully adult bird. It will be seen on comparing that figure with the plate now given that the following characters are the indications of *full maturity*:—first, the *pale* blue or grey mantle, every feather being broadly edged and tipped with rufous; second, the very rufous head, the moustachial stripe being also shaded off with the same colour; third, the warm reddish tint of the underparts, which, *from the throat to the vent are wholly devoid of any markings at all*, there being only a *few* light-blue or lavender dots on the *lower flanks and tibial plumes*.

I cannot understand Mr. Hume's 16-inch *male*†; his measurements surely refer to a female; if he were correct, *Falco babylonicus* would be fully as large as *Falco peregrinus* (my males of the latter average under 16 inches!), whereas it is in reality a smaller species.

27 *bis*. AQUILA BIFASCIATA, Gray and Hardw.

That *Aquila orientalis*, Cab., has hitherto (erroneously though) been held to be distinct from *Aquila bifasciata*, Gray and Hardw., by continental naturalists admits no longer of any doubt. I have just

† *Cf.* 'Rough Notes,' part i. p. 80.

received a typical "*bifasciata*" in evidently nestling or first plumage from Dr. Crowfoot, labelled "*orientalis*, juv., Sarepta, August," of which the following is a description:—General colour of upper parts a rich hair-brown; the lower surface is a little lighter in tone; some of the feathers of the nape of the neck (as in the nestling of *A. hastata*) are tipped with fulvous; *the lower row of median coverts, the greater wing-coverts, and ends of the secondaries and tertials are very broadly ended with salmon-colour or reddish buff, forming three distinct wing-bars when the wing is closed*; some of the median coverts nearest the tertials have the buff spot at the end of the feather of a long or isosceles-triangular shape, the point of the spot being of course towards the base of the feather; most of the lower-back feathers are broadly edged with buff, and the lowest ones adjoining the upper tail-coverts are longitudinally marked with duller buff; one or two of these feathers have this colour almost confined to one side of the feather, with a slight spot on the other web; others have a very large oval spot of dull buff on the apical half of the feather, with a brown stripe down the middle of the feather dividing the buff; the side feathers of the lower back are much paler brown, and the broad edges of the feathers are dull white instead of buff; all the upper tail-coverts are of a beautiful buff or salmon-colour, having their edges somewhat paler; the tibial plumes are tipped with dull whitish; the lower tail-coverts are first dull white streaked with brown, and those beyond them nearest the tail are dull unspotted buff; along the ridge of the wing towards bases of primaries there are some whitish spots, and the primary-coverts are broadly ended with salmon-colour, like the greater coverts; lining of wing brown near bend; lower down the feathers are tipped with white, and those nearest the primaries are largely patched with buff, the lowest feathers of all being white with some grey patches; axillary plumes brown, with white tips; primaries black; secondaries not so black; tertials a dark brown, save the light tips of the two latter; the inner primaries towards their bases are slightly mottled on their inner webs with grey, and the secondaries and tertials increasingly so, taking the form of distinct bars on the two latter; tail dark brown, barred with grey, all the feathers being broadly ended with reddish buff; the cere and feet appear to have been greenish yellow; the outer primaries are not fully grown; and as the specimen was procured in August, it is in all probability not more than three months old; length of wings 19·75, tail 10·25, tarsus 3·6, bill from gape 2·8; the nostrils are long ones, placed *obliquely, as is characteristic of A. bifasciata*.

This specimen, probably a female, is not full-grown, as the outermost primaries are only partially developed; and it is evidently in nestling plumage, as indicated by its uniform rich, soft, silky, dark brown plumage; the wing-bands as well as upper tail-coverts (these would have become gradually white from exposure to the influence of the sun) are of a *rich fulvous or salmon-colour. I have frequently killed this Eagle in a similar stage of plumage**; but the wing-bands and upper tail-coverts of the vast majority of them by the time they arrive in this country *get bleached to a dirty white, leaving only traces of the salmon-colour above referred to.*

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* *Cf.* P. Z. S. 1872, p. 621.

In the present example the underparts are of a *uniform* dark brown colour; *i. e.* there is no indication of the stone-coloured blotches I have before referred to†; but this, I think, is due to individual variation, and I attach no importance whatsoever to the absence of this peculiarity in a solitary specimen.

It will thus be seen that Dresser's larger figure ('Birds of Europe,' part xxxiii.) represents a bird in *nestling plumage, after the buff bands have faded considerably.* How long it remains in this *bifasciated* plumage can only be ascertained by keeping one in captivity; but it is as well to repeat‡ that the assumption of the fully adult dress is attained by the gradual disappearance of the wing-bands (these at first are buff or salmon-coloured, and then white) and the markings on the under surface (when present), after which it presents a *uniform brown throughout,* with the addition (in the course of time) of a fulvous nuchal patch, which is *the* sign of a fully matured bird. The growth, however, of this patch is far from regular, and few specimens are procured having it fully developed; at times it is confined to the top of the head, at others to the nape of the neck in a crescentic or half-moon shape.

27. AQUILA MOGILNIK, G. Gmel.

Having now seen the nestling of *A. bifasciata* and *A. hastata,* I feel confident, for analogous reasons, that the Aden-killed *A. mogilnik* in the lineated stage§ was also in nestling or first plumage. This specimen was of a much richer tone throughout than the birds usually procured in this country, the fact being that the sun had not as yet affected the original tint of its plumage.

*40. PANDION HALIAËTUS, Linn.

I lost a wounded Osprey on the 24th November last at a *jheel* in this district, which caused me not a little regret, the more so as I toiled after the bird up to my knees in water, first for some four hours in the morning, and again in the afternoon. It was very wild, keeping to the middle of a large open piece of water, and invariably settling on a decayed stump of a babool tree, where there was no approach of any sort. The place swarmed with larger Eagles, of sorts which never allowed the stranger to have a moment's rest, and were continually depriving it of its well-earned prey.

Mr. Cockburn, Curator of the Allahabad Museum, has lately given me a fine mature female which he shot in that district, where, he says, it is far from uncommon. In the well-watered parts of Northern Oudh and Eastern Bengal it is much more common; but the majority of the jheels in the Doab are too shallow as well as too weedy to attract this purely fish-eating Eagle.

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† *Cf.* P. Z. S. 1875, p. 21.

‡ *Cf.* P. Z. S. 1872, p. 622.

§ *Cf.* P. Z. S. 1875, p. 21.

51. Circus swainsonii, Smith.

A young male of this species which I shot on the 25th October last, close to Futtehgurh, is very interesting, as it illustrates the manner in which the light grey plumage of the adult male is gradually assumed. The rufous head and rust-coloured markings on the underparts of this specimen, which was sexed by myself, indicate that the juvenile dress of the young male resembles in some degree that of the female. I have recently had an opportunity of examining another young male, belonging to Mr. Brooks, which is in a still further advanced stage, having only the *forehead* rufous.

The irides of the Futtehgurh-killed bird were bright yellow, as in fully adult specimens; the legs and feet were light yellow; the bill and claws were black; and the cere was greenish yellow.

*52. Circus cineraceus, Montagu.

Jerdon's statement† "equally abundant with the last . . ." and, again, "I have found it in every part of India" requires modification as regards the deltaic portion of the North-western Provinces, an area comprising several thousand square miles. In this part of the country, although *C. swainsonii* is extremely common everywhere, *C. cineraceus* can only be considered in the light of an occasional straggler; and as the capture I am about to record throws some light on the geographical range, plumage, and food of this species, it is of interest in more ways than one.

Returning to my camp late in the evening of the 12th March, through an extensive tract of stiff dry grass from two to three feet high, I suddenly disturbed a large gathering of Harriers that had evidently settled on the reed beds for the night. There could not have been less than forty birds, inclusive of a few short-eared Owls that were *closely packed* in that one spot. As they circled overhead I recognized *Circus æruginosus* in all shades and colours; there was also a fair sprinkling of *C. swainsonii*, male and female. Being at the time on the *qui vive* for strangely coloured Harriers, I singled out and brought down what appeared to me on the wing to be a bird that could hardly be referred to the latter species. It fell from a good height on to the edge of a dry pond, rupturing its crop, which was very much distended and literally crammed with the callow young and eggs of *Galerida cristata* and *Pyrrhulauda grisea*, the majority of these dainty morsels having been swallowed entire.

The specimen underwent a critical examination by candlelight; and great was my delight when, instead of the common *C. swainsonii*, I found that my list could now boast of the addition of a fine adult male example of Montagu's Harrier. The plumage accords with Yarrell's description of the *adult male*—with this notable exception, however, that in my specimen the *whole of the underparts, from the chin to the under tail-coverts, are uniform with the mantle, viz. bluish grey*, dashed with longitudinal streaks of orange on the vent and thigh-coverts, whereas the author I have quoted (as in fact do Jerdon, Sharpe, and Hume[†]) gives the *breast only* as bluish grey, and the *rest of the underparts (of the adult male) as white.* Nowhere do I find the *whole of the underparts* described as *bluish grey the same as the back*; so that the present example would appear to be unique in this respect[‡].

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† *Cf.* 'Birds of India,' vol. i. p. 98.

The following are its dimensions:—length 17·6, wing 14·5, tail from vent 9·4, tarsus 2·3. The irides were bright yellow; the legs and feet were dingy or pale yellow; the bill and claws were black; and the cere was greenish yellow.

But though this bird was doomed to succumb to the cause of science in a foreign country, the most melancholy event in its history is connected with its life in far more civilized climes than India; for its broken leg clearly testifies to the narrow escape it has had from falling a victim to the vengeance of some one's zealous game-preserver, most probably while acting as one of the "sanitary police of Nature." The left tarsus has the appearance of having been snapped in a trap, about the middle of the joint; the skin, which apparently had not been severed, has enabled the broken portion to reunite *sideways*; and though the fracture has healed in a most remarkable manner, the lower part of the leg hangs by the skin, which has assumed the form of a thick tegument; so that for all practical purposes, excepting perhaps for roosting, the injured leg could not have been of any use; the broken stump protrudes beyond the join by a quarter of an inch.

The range of Montagu's Harrier in Northern India is very puzzling. In the jungle tracts of Bundelkhand (south of the Jumna) it is far from uncommon, and in parts of Oudh and Rohilkhand (north of the Ganges) it is pretty generally distributed; so that its absence in the Duab, an enormous tract of country, large areas of which are in every way suited to its habits, is very singular indeed.

*53. Circus melanoleucus, Gmel.

It is with much pleasure that I announce for the first time the advent of this unexpected addition (essentially an inhabitant of the humid country of Eastern Bengal and the Tarais generally) to the comparatively speaking arid plains of the North-western Provinces. The specimen in question fell to the shot of my friend Mr. Luard, on the 10th of February, when we were out shooting on the banks of the Ganges, near Futtehgurh. When shot it had just alighted on the ground, and was in the act of eating a large green grasshopper; its crop contained orthopterons insects of various kinds.

It is an exceedingly fine male in the pied livery of the adult bird; its large, lustrous, gold-coloured eyes contrast strangely with its black and white plumage, giving it in life a most beautiful appearance. Carefully measured in the flesh it gave the following results, which, for the sake of comparison with the measurements of *Circus swainsonii* and *C. cineraceus*, I annex in a tabular form:—

[†] *Cf.* 'Birds of India,' vol. i. p. 97; 'Catalogue of Accipitres,' vol. i. p. 66; 'Rough Notes,' p. 303.

[‡] Since the above was written I have received two male specimens of *C. cineraceus* from Europe; and in both examples the *breast only is bluish grey.*

Species.	Length. in.	Wing. in.	Tail from vent. in.	Tarsus. in.
C. swainsonii ♂	17·6	13·2	8·8	2·6
C. cineraceus ♂	17·6	14·5	9·4	2·3
C. melanoleucus ♂	16·5	13·6	8·5	3·0

Remarks. Particular attention is drawn to the long wing and tail of *C. cineraceus,* and to the characteristic long tarsus of *C. melanoleucus.*

The irides of the present specimen were gold-coloured; the legs and feet were dingy yellow; the bill was blue-black; the claws were black; and the cere was pale yellow.

Before leaving the subject of *C. melanoleucus,* I may mention, from my own experience, that the Oudh tarai generally, as far west as the Shahjehanpore district, as well as parts of Central Oudh (where-ever there are extensive grass jungles) may be added to the localities given by Hume as the *regular* range of this species*.

70. ASCALAPHIA COROMANDA, Lath.

The coloured eggs of *Poliornis teesa,* referred to in my last paper, have been wholly eclipsed by the acquisition of a pair of really well-marked eggs of the Dusky Horned Owl, which I took on the 28th of November last from an old nest of *Mycteria australis,* shooting one of the parent birds off the nest.

Mr. Hume, who has seen these eggs, and who was not a little sceptical in the matter of Owls so far forgetting themselves as to lay *spotted* eggs, writes to me as follows:—"Your eggs of *Ascalaphia coromanda* are spotted in a remarkable way. After carefully examining them I have now nothing to say contrary to what you hold; held up against the light the colour of the shell, a dull sordid yellow, is precisely that of many *white* eggs of *A. coromanda;* and under a powerful microscope the granulations appear to me to be similar to those of *A. coromanda.* Of this Owl I must still have seventy or eighty specimens by me; and I have taken eggs without number, and I do not think I ever saw a *single spot* on any one of them."

One of these eggs was quite fresh; the other had been incubated for some ten days or so. In order to make certain that this was not a case of mistaken identity, I visited the nest several times in company with my friend Mr. Hastings before removing the eggs.

The markings consist of indistinct lilac blotches, showing through the shell, as it were, on of course a pure white ground; and they are both *profusely* though *minutely spotted,* especially at the obtuse end, with brown and lilac spots (or, rather, specks) of various shades.

In conclusion I have a few emendations to make to my last paper P. Z. S. 1875, p. 16, pl. iii.

In the first place the two figures of *A. hastata* have been wrongly numbered. No I. is the one with the *striated* breast; otherwise the plate and letterpress do not accord. Again, the explanation of

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* *Cf.* Hume in Journ. Asiat. Soc. 1870, and 'Stray Feathers,' vol. iii. p. 34.

Plate III. at the end of the article requires amendment, and should stand thus:—Fig. 1. *A. hastata*, young ♀, from a specimen obtained from the nest at Saharunpore, and killed 28th August, 1873, being the youngest of the three birds obtained on the same occasion. Fig. 2. *A. hastata* ♀, from a specimen after its first moult; killed October 21st, 1874.

The figures have been reduced to one fourth of the natural size.

Note.—These birds were made into specimens when in captivity; they were not shot.

3. On the *Stercorariinæ* or Skua Gulls.

By Howard Saunders, F.L.S. &c.

[Received March 3, 1876.]

(Plate XXIV.)

In the following remarks upon the well-marked subfamily of the *Laridæ*, known as the *Lestridinæ*, or, more correctly as regards priority of nomenclature, as the *Stercorariinæ*, I shall pass over as briefly as possible the points which are already known to most ornithologists, and direct my observations to the synonymy and range of the members of the group, with incidental remarks upon their progressive stages of plumage. My principal predecessor in this work is Dr. Elliott Coues, who published in the 'Proceedings of the Academy of Natural Sciences of Philadelphia,' 1863, an elaborate "Review of the Lestridinæ," with the primary object of showing that the true "*Lestris richardsonii*" of Swainson, described in the 'Fauna Boreali-Americana,' p. 433, was a distinct species from the light-breasted form with which most naturalists had united it; but in his recently published 'Birds of the North-West' (Washington, 1874) he retracts this opinion, in accordance with the views derived from more extended experience. He still, however, adheres to his original plan of dividing the family into two subgenera, *Buphagus* of Moehring for *S. catarrhactes* and *S. antarcticus*, and *Stercorarius* for the remaining species; and he continues to employ both the generic and the specific names given by writers previous to the date of the 12th edition of Linnæus's 'Systema Naturæ' (1766), preferring to make the 10th edition the starting-point of his system of nomenclature. Argument on this subject would be futile; there is nothing to prevent any American naturalist from making his own rules; but British ornithologists have a recognized code of laws in the Rules of the British Association for 1842, drawn up and signed by the principal naturalists of that day, and generally adopted up to the present time both here and on the continent. In these it is agreed that the principle of priority ought not to be carried back beyond the 12th edition of Linnæus, a solitary exception being made in favour of those *genera* of Brisson which are *additional* to those of Linnæus's 12th edition. My excuse for recapitulating these axioms is, that in consequence of them it is necessary to reject several names given by Brünnich in his 'Ornithologia Borealis,' 1764, which antedates our starting-point by two years—a fact of which some ornithologists, who have probably not examined the date of publication, do not seem to be aware. Under these circumstances, it is needless to discuss the subgenus *Buphagus* of Moehring (1752); nor do there appear to be any sufficient structural differences to warrant the generic separation of the Great Skuas from the other species, the Pomatorhine Skua forming such a connecting link between the heavy and the elegant forms as to preclude any consistent separation, unless Reichenbach's genus *Coprotheres* be also accepted for the Pomatorhine. For myself I prefer to retain all the known species of Skua in the same genus, viz. *Stercorarius* of Brisson (1760), the type of which is the species whose rightful name is, in my opinion, *Stercorarius crepidatus* (Gm.), but which I will for the present, to avoid any ambiguity, distinguish by the vernacular name of *Richardson's Skua.* I am, of course, aware that this name was originally applied solely to a dark *form* of a well-known species; but it has since been generally adopted; and as having been applied to no other, its use precludes the possibility of a misunderstanding.

The genera are as follows:—

Larus (part), Linnæus, 1766. *L. catarractes*=Great Skua, *L. parasiticus*=Long-tailed or Buffon's Skua.

Stercorarius, Brisson, 1760. Type "Le stercoraire" = *S. crepidatus* (Richardson's Skua).

Labbus, Rafinesque, 1815; *Predatrix*, Vieillot, Analyse, 1816. Based on "le Labbe," of Buffon, which is *Richardson's Skua.*

Lestris, Illiger, Prod. 1811. "*L. parasiticus, L. crepidatus, L. catharractes.*"

Oceanus, Koch, 1816. "*O. parasiticus, O. crepitatus*" (sic).

Cataractes, Fleming, Phil. Zool. 1822. "*Cataractes vulgaris.*"

Coprotheres, Reichenbach, 1852. *S. pomatorhinus.*

Megalestris, Bonap. 1856. *S. catarrhactes, S. antarcticus.*

The generic name, variously spelt *Cataractes, Cataracta*, or *Catarracta*, the two latter adopted by Retzius and Leach from Brünnich, had been previously applied to a subgenus of the *Uriinæ*; and under the name of *Catarrhactes antiquus*, Prof. Marsh has described some bones found in the Tertiary deposits of N. Carolina (Am. J. Sc. 1870, p. 213). I mention this because these applications of generic names to widely different birds are very confusing, and might lead to the supposition that the fossil remains of a Skua had been discovered. Those who persist in separating the Skuas must therefore adopt *Megalestris* for the large forms, as the small pointed-tailed species are the types of all the other genera. It is certainly unfortunate that the earliest available name *Stercorarius* tends to perpetuate a popular fallacy, although one of universal distribution; but a precisely parallel case occurs in the signification of the word *Caprimulgus*, and other instances might be adduced. Illiger's generic name *Lestris* (or robber) is undoubtedly far preferable, so far as its meaning goes, and it has been very freely adopted; but the laws of priority compel us to reject it, if we would avoid perpetuating confusion.

I have deemed it advisable on the whole to give the references to those præ-Linnæan authors upon whose descriptions those of writers subsequent to 1766 are based, marking by a line the division between them and the available nomenclature. The synonyms are given in order of date; and I have also inserted those references which appeared to me to have any real value. It is impossible to avoid some errors; but at least I have taken every precaution, and with some few exceptions, where the original works were not accessible, I have personally verified every reference.

STERCORARIUS CATARRHACTES.

Larus fuscus, Briss. Orn. vi. p. 165 (1760).

Catharacta skua, Brünn. Orn. Bor. p. 33 (1764).

Larus catarractes, Linn. Syst. Nat. i. p. 226 (1766), ex Brünn.

Larus catarrhactes, Gmelin, Syst. Nat. i. p. 603 (1788).

Cataracta skua, Retz. F. Suec. p. 161 (1800).

Lestris catharractes, Illiger, Prodromus, p. 273 (1811).

Lestris catarractes (L.), Tem. Man. d'Orn. p. 511 (1815); Faber, Prod. Island. Orn. p. 102 (1822); Macgill. Brit. Birds, v. p. 479 (1852).

Catarracta fusca, Leach, S. Cat. M. & B. Brit. Mus. p. 40 (1816).

Stercorarius catarrhactes, Vieillot, N. Dict. H. Nat. xxxii. p. 154 (1819); Gray, Gen. Birds, iii. p. 653 (1849); Dresser, B. of Eur. pt. xli. (Sept. 1875).

Cataractes vulgaris, Fleming, Hist. Brit. An. p. 137 (1828); Selby, Ill. Brit. Orn. ii. p. 514 (1832).

Lestris cataractes et *Lestris skua*, C. L. Brehm, Vög. Deutsch. p. 715 (1831).

!*Stercorarius pomarinus*, Vieillot, Gal. Ois. p. 220, pl. 288 (1834), fig. excell. (!)

Lestris cataractes, Naum. Vög. Deutsch. x. p. 471, pl. 270 (1840).

Stercorarius cataractes, De Selys-L. Fne. Belg. p. 155 (1842).

Megalestris catarrhactes, Bp. Cat. Parzudaki, p. 11 (1856).

Stercorarius catarractes, Bp. Consp. Av. ii. p. 206 (1857); Laurence, Ann. Lyc. Nat. H. N. York, 1853, p. 7; Baird's B. N. Am. p. 838 (1860); B. Ross, Nat. Hist. Rev. 1862, p. 289; Feilden, 'Zoologist,' 1872, p. 3290.

Buphagus skua, Coues, Proc. Ac. Nat. Sc. Phil. 1863, p. 125, B. of N. W. Am. p. 604 (1874).

There was no particular variation observable in the plumage of sixteen specimens from the Faroe Islands, and in many others sent to me from time to time for examination; the older the bird the wider are the chestnut markings which occupy the centre of the feathers on the upper parts, and the longer and the more yellow become the filamentous feathers of the neck. The *under wing-coverts* and the *axillaries* are always *sooty*, with, at most, but very few and ill-defined russet markings. I have examined the interesting melanism belonging to Mr. J. H. Gurney, jun., figured by Mr. Dresser in his 'Birds of Europe;' it was obtained in October, and the first primary on each wing has not yet attained its full length. From the crescentic edges to the dorsal feathers, seen on holding it to a side light, from the absence of acuminate feathers on the neck, and from the weak bill (which is much thinner than in Mr. Dresser's plate), I have little doubt of this example being a bird of the year; this impression is confirmed by the satin-like appearance of the primaries and upper parts, which is very different from any thing I have ever observed in birds whose plumage has undergone any wear.

The range of this species is the most restricted of any member of the family which breeds in the northern hemisphere. It has not been observed in Spitzbergen; and its most northern breeding-place within the Arctic circle is at the Lofoten Islands, off the coast of Norway; thence it is found nesting west and southwards to Iceland, the Faroes and the Shetland Islands. It is not recorded from the Baltic, or from the White Sea. Seebohm and Harvie Brown did not observe it in their recent expedition to the mouth of the Petchora; nor did Middendorf find it in N. Siberia, where the other three European species breed. Von Baer's identification of this bird in Novaya Zemlya may well be doubted, as none of the many subsequent explorers have observed it there. Pallas (Z. Ros.-As. ii. p. 309) supposed that this might have been the bird recorded by Steller, as observed in 58° N. lat., on the Pacific coast, feeding on the carcass of a whale; but as it had a "yellowish bill" it was more probably a Fulmar Petrel. It has not been recorded as yet from the Pribilov Islands, the Aleutians, or Alaska; but it probably occurs along that coast, as a single specimen is described by Mr. Lawrence as having been obtained off Monterey, in California. Mr. Bernard Ross found it at the mouth of the Mackenzie river, and about Great Slave Lake, north of which it is very rare; it also appears to range throughout the Hudson's-Bay territory, and is clearly, as far as dimensions go, the "*L. keeask*" of Latham, mixed up with the Pomatorhine Skua, as shown by the description of the particoloured feet; the Esquimaux name of the latter species also happens to be "Keeask," according to Richardson, who does not mention *S. catarrhactes*. There is no authentic record of its occurrence on the Atlantic sea-board of the United States; and in South Greenland it was only twice observed by Holböll. From its breeding-stations it passes southwards in autumn along the western shores of Europe as far as the Straits of Gibraltar and N. Morocco, beyond which there is, as yet, no trace of it. As a mere straggler, of course, it has been found in Germany; and it was recorded by Mr. C. A. Wright as having been obtained at Malta (Ibis, 1864, p. 150); but the specimen has subsequently proved to be *S. pomatorhinus*. Mr. Godman does not enumerate it amongst the birds of the Azores, Madeira, or the Canaries; but future observations may probably show a somewhat more extended range than I have been able to trace.

As a species it is nowhere abundant, and of late years its numbers in the Faroes and Shetland Islands have so seriously diminished as to render its speedy extermination there extremely probable. Although, like the rest of the family, it is essentially a "robber gull," yet it is by no means entirely parasitic; for it feeds to a great extent upon flesh, and especially upon the Kittiwake gull, of whose feathers and bones all the castings were composed which Capt. Feilden examined at the Färoe Islands, whilst the stomachs of those he shot were full of flesh. This purely maritime Gull is the only one which can be plundered with impunity that is found in any great numbers in the haunts of the Great Skua; for the Herring- and Great Black-backed Gulls would not tamely yield their prey; and it is worthy of note that the winter range of *S. catarrhactes* extends no further south than that of the Kittiwake. We shall see that the heat of the tropics proves no barrier to other northern species which, from their superior swiftness of flight, require less specialized conditions for their existence.

STERCORARIUS ANTARCTICUS.

Lestris catarractes, Quoy and Gaimard, Voy. 'Uranie,' p. 137, Atlas, pl. 38 (1824) (Falkland Islands); Gould, B. of Aust. vii. pl. 21 (1848); Hutton, Ibis, 1872, p. 248 (*Chatham Islands*).

Lestris antarcticus, Lesson, Traité d'Orn. p. 616 (1831); Scl. and Salvin, P. Z. S. 1871, p. 579 (part).

Megalestris antarctica, Gould, P. Z. S. 1859, p. 98.

Lestris antarctica, Sclater, P. Z. S. 1860, p. 390; Abbott, Ibis, 1861, p. 165 (Falkland Islands).

Lestris fuscus, Ellman, Zoologist, 1861, p. 7472.

Buphagus antarcticus, Coues, Proc. Phil. Ac. 1863, p. 127; B. N.W. Am. p. 604 (1874).

Lestris catarrhactes, Hutton, Ibis, 1867, p. 185.

Stercorarius antarcticus (et *madagascarensis*?), Bp. Consp. Av. ii. p. 207 (1857); Von Pelzeln, Novara-Reise, Vögel, p. 150 (1865) (*St. Paul's I.*); Buller, B. New Zealand, p. 267 (1873).

Stercorarius catarractes (*b*), Schlegel, Mus. P.-B. p. 47 (1865); Layard, B. S. Africa, p. 366 (1867); Sharpe, Zool. 'Erebus and Terror,' i. App. p. 32 (1875).

Buphagus skua antarcticus, Coues, in Bull. U.S. N. M. no. 2 p. 9 (1875) (Kerguelen Island)*.

Quite irrespective of the enormous gap which, so far as we know, at present separates the geographical range of *S. catarrhactes* from that of the Antarctic Skua, it seems to me that only the want of a sufficient series of both species for comparison can ever have led to their being united; for undoubtedly the distinctness of many other birds as species is unhesitatingly acknowledged on much slighter grounds. In the examination of a large series I have never met with any northern Skua with the stout deep bill with its well-marked angle at the gonys which invariably characterizes the southern bird; and if mere colour is taken into consideration, the total absence of rufous both on the underparts, the axillaries, and the under wing-coverts serves to distinguish the Antarctic Skua at a glance. But whilst perfectly distinguishable from *S. catarrhactes*, it presents three interesting variations in the course of its range, which I have been enabled to trace by the aid of a fine series in the British Museum. From Campbell's Island in 54° S., 168° E., up to Norfolk Island, in 29° S. (its most northern *known* range), past Kerguelen's Island, the Crozets, and up to the Cape of Good Hope, where Layard observed it in April, the specimens all agree in their remarkable uniformity of sooty-brown plumage, there being few, if any, striations even upon the feathers of the neck, whilst the size of some of the examples is enormous, the primaries measuring 16 and 17 inches from carpal joint to tips of primaries. The Falkland-Island Skuas, locally known as "Cape-Egmont Hens" and "Sea-Hens," are decidedly smaller, and the acuminate feathers of the neck and shoulders are distinctly streaked with yellowish white, although the general sooty appearance is preserved. But in three specimens obtained during the voyage of the 'Erebus' and 'Terror,' on the edge of the pack-ice, the upper parts are somewhat less dusky than in the Falkland-Island birds, and the tips of the feathers of the breast are tinted with yellowish, though the underparts of the feathers retain their sooty hue, whilst the acuminate feathers of the neck form a complete ring of yellow verging upon golden, and, by contrast with the darker colour of the crown, giving somewhat the appearance of a hood. In general dimensions this form is somewhat smaller than the preceding, and the bill is even more short and stout in proportion; but the general characters of resemblance are preserved throughout, the under wing-coverts and axillaries being dark smoke-coloured, whilst the lighter hue of the underparts extends no further than the tips of the feathers, and may be due to climatic influences. In their somewhat bleached appearance and the closer texture of the feathers about the base of the bill, these three birds have the appearance of permanent inhabitants of inhospitable circumpolar regions, whilst the Falkland-Island birds seem to be a connecting link between this and the larger form, whose range is principally within more temperate climates, where the conditions of existence are easier.

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* Since writing the present article I have read the very interesting account of the habits of this species as observed at Kerguelen's Island by Dr. Kidder, Naturalist to the American Expedition to observe the Transit of Venus. It would appear that it avoids the water, and preys principally upon other birds; there are also other modifications of the usual habits of birds of this genus, to which space will not allow me to allude.

It is most probable that Bonaparte's *S. madagascarensis* belongs to this species, as the late Commander Spurling saw what he supposed to be a Great Skua off the Comoro Islands, and this would bring its extreme range up to about 12° S., leaving even then an interval of more than 40° of latitude between it and the most southerly known range of *S. catarrhactes*. Neither has *true S. antarcticus* been found, so far as I am aware, on the western side of the Straits of Magellan, or on the coasts of Chili or Peru, where its place is taken by a bird which I consider fully entitled to specific rank, and which, strange to say, has all its affinities with the northern Skua, *S. catarrhactes*.

STERCORARIUS CHILENSIS (Plate XXIV.).

Lestris antarcticus, var. *b. chilensis*, Bp. Consp. Av. ii. p. 207 (1857); (Mus. berol. ex Am. Merid. Rostro vix breviore quam in Europæo, potius graciliore quam robustiore).

Lestris antarctica, Scl. & Salvin, Ibis, 1869, p. 284 (Santa Magdalena, Straits of Magellan—*Cunningham*).

S. *supra fuliginoso-nigricans, pileo summo fere concolori; corpore reliquo superiore maculis longitudinalibus rufescentibus versus apicem angustioribus plus minusve dilatatis variegato; collo postico albicante vix rufescente longitudinaliter striato; alis dorso concoloribus, remigum scapis albis, tectricibus alarum minimis dorso concoloribus et in eodem more rufo maculatis: primariis vix albido, secundariis maculis magnis rufescentibus terminatis; supracaudalibus rufo marmoratis et subterminaliter maculatis; cauda nigra, pallidius terminata; loris et plumis subocularibus fuliginosis pileo concoloribus, his rufo lavatis; genis, regione parotica, et corpore subtus toto cinnamomeo-rufis; axillaribus et tectricibus subalaribus castaneo-rufis, his et pectoris lateribus paullo fuliginoso striatis; colli lateribus dorso concoloribus; ala subtus nigricante, primariis basin versus albis; rostro nigro; pedibus nigris. Affinis* S. catarrhacti, *sed rostro graciliore, corpore subtus conspicue cinnamomeo-rufescente, et subalaribus et axillaribus castaneis distinguendus.*

Professor Peters, of Berlin, to whom I wrote on the subject, has courteously informed me that the type specimen in that museum has all the above characteristics. It is a slightly immature bird, and came from Chili.

Through the kindness of Mr. G. Fanshawe, F.Z.S., I have lately become possessed of four specimens of a Skua shot by his nephew, Mr. J. R. Denison, at Mejillones, on the little strip of coast which belongs to Bolivia, in lat. 23° 5′ S., at the end of February or beginning of March. Three of these birds are adults; the fourth is evidently immature, as shown by the brown crescentic tips to the dorsal feathers; and the rufous of the underparts is less strongly marked than in the adults, showing that the ruddy colour increases with age. But even the young bird is ruddier than any *S. catarrhactes* I ever saw. In the museum at Cambridge is a similar immature specimen obtained by Dr. Cunningham, late of H.M.S. 'Nassau,' in the Straits of Magellan, in April; and Mr. Gervase Mathew, R.N., writes to me that he observed this chestnut-breasted bird at Valparaiso in January, and a month later at Coquimbo, when in H.M.S. 'Resolute.' More than this is not known to me at present; and in the absence of any reliable information as to its breeding-haunts it would be rash to indulge in any speculations as to whether they are to the north or to the south of the Equator. The affinities of this well-defined form are decidedly with *S. catarrhactes*, and not with *S. antarcticus*; it is, indeed, a somewhat slighter bird than the former, and remarkable for its rich cinnamon-coloured underparts, wing-coverts and axillaries. The presence of this species on the shores of the South Pacific may be accounted for by the cool stream of water, about 300 miles wide, and known as Humboldt's current, which runs northwards from the Straits of Magellan, along the coasts of Chili and Peru. This cool band abounds in fish; and in consequence of these altered conditions we find there at least six species of Gull, some of them numerically abundant; whereas on the east coast of America there is a noticeable scarcity of Gulls within the tropics. Where Gulls are found, the stout heavy forms of Skua can pick up a living; their more lightly formed congeners can rob the Terns, and the two long-tailed species are more than a match in flight for the Arctic Tern; but against that family the Great Skuas would have little chance; and hence, probably, their more restricted range. If this species should prove to have its breeding-places in the North Pacific, it is somewhat singular that it should never have been observed north of the Equator, and that the only specimen of a great Skua recorded from the north-west coast, namely at Monterey, California, lat. 44° N., is clearly from the description given, *S. catarrhactes*. If, on the other hand, it should prove to be a denizen of the southern hemisphere, it is still more remarkable that we should find in such close proximity to *S. antarcticus* a form whose affinities are with *S. catarrhactes*. In order of arrangement it should follow the latter species, although in the present case I have taken it last for convenience of treatment.

STERCORARIUS POMATORHINUS.

Stercorarius striatus, Brisson, Orn. vi. p. 152, pl. 13. fig. 2 (juv.), 1760.

Larus keeask (part.), Latham, Ind. Orn. p. 818 (1790).

Larus parasiticus, Meyer & Wolf, Tasch. D. Vög. ii. p. 490, descrip. p. 492 (1810), nec auctorum.

Catarracta parasita, var. *camtschatica*, Pallas, Zoogr. Rosso-As. p. 312 (1811).

Lestris pomarinus, Temm. Man. d'Orn. p. 514 (1815); Audubon, B. Am. vii. p. 186, pl. 451 (1844); Ross, in Parry's 4th Voy. App. p. 196 (1828), fide Newton.

Stercorarius pomarinus, Vieillot, N. Dict. Hist. Nat. xxxii. p. 158 (1819); De Selys-L. F., Belg. p. 155 (1842); Gray, Gen. of B. iii. p. 653 (1849); Coues, Proc. Phil. Ac. 1863, p. 129; B. Ross, Nat. Hist. Rev. 1862, p. 289 (Gt. Slave Lake, very rare); Wright, Ibis, 1864, p. 151 (Malta); Gurney, Andersson's B. of Damara Land, p. 357 (1872).

Cataractes pomarina, Steph. in Shaw's G. Zool. xiii. p. 216 (1826).

Cataractes pomarinus, Selby, Ill. Brit. Orn. ii. p. 517 (1832).

Lestris sphæriuros, Brehm, Vög. Deutsch. p. 718 (1831).

Lestris striatus, Eyton, C. Brit. Birds, p. 51 (1836).

Lestris pomarina, Faber, Prod. Island. Orn. p. 104 (1822); Sw. &

Rich. F. Bor.-Am. p. 429 (1831); Naumann, Vög. Deutsch. x. p. 487, pl. 271 (1840); Temm. Man. d'Orn. p. 495, ed. 1840; Middendorf, Sib. Reise, p. 240, tav. xxiv. fig. 1 (egg) (1853).

Coprotheres pomarinus, Reich. Nat. Syst. Vög. p. v (1852).

Catarracta pomarina (Tem.), Blyth, J. As. S. Bengal, xxviii. p. 406 (1859) (Moulmein).

Lestris pomerinus (Tem.), Newton, P. Z. S. 1861, p. 401, pl. xxix. fig. 3 (egg).

Lestris pomarhinus, Preyer, R. n. Island (1862).

Lestris pomatorhinus, Sclater, Ibis, 1862, p. 297.

Stercorarius pomarhinus, Malmgren, Spitzbergens Fogl. p. 411 (1864).

Stercorarius pomatorhinus, Newton, Ibis, 1865, p. 509; Gillett, Ibis, 1870, p. 307; Coues, in Elliot's Prybilov Is. (1874); Coues, B. of N.W. Am. p. 607 (1874); Eaton, Zoologist, 1874, p. 3812 (Spitzbergen); Newton, B. Greenland, p. 107 (1875).

Lestris pomatorhina, Th. v. Heuglin, Ibis, 1872, p. 65.

The description and figure given by Brisson of his *Stercorarius striatus* clearly show that he had before him an immature specimen of this species, the representation of the strong heavy feet garnished with large claws being highly characteristic. Although Brisson's name cannot be retained, yet, if it had been adopted by any naturalist subsequent to the 12th ed. of Linnæus, it must necessarily have antedated the well-known name given by Temminck; but this change has fortunately been spared us. With regard to Gmelin's name of *crepidatus*, which Dr. Coues was inclined to refer to this species, I trust to be able to show that it can only belong to that which I call for the present Richardson's Skua. Temminck's name is therefore retained, subject to the emendation proposed by Mr. P. L. Sclater (Ibis, 1862, p. 297), where he showed that the classical spelling should be *pomatorhinus*, being derived from πῶμα (operculum) and ῥίν (nasus), a view which has since been generally adopted by ornithologists. There can be no doubt from the description, especially of the tail-feathers, given by Pallas that this is the species called by him *C. parasitica*, var. *camtschatica*.

In plumage this species does not exhibit any remarkable variation, although some immature birds are decidedly less marked with sooty striations on the underparts than others. In the adults the acuminate feathers on the neck assume a beautiful golden tinge; and the dark pectoral band evidently becomes narrower with increasing age until it is totally lost and the bird is pure white from the chin to the abdomen. I have only seen one example of this extreme plumage, in the Rouen Museum, which boasts of nineteen picked specimens of Pomatorhine Skuas, none of which, unfortunately, bears any label indicating either date or locality.

The most northern locality recorded for this species is lat. 82° N., where a specimen was observed by Ross flying past the boats on Parry's fourth voyage. It has been found on the coast of Spitzbergen, and in Novaya Zemlya; and south of these points it ranges throughout the whole of the arctic and subarctic regions. Von Middendorf found it breeding on the "barrens" of the Taimyr and the Boganida, in Siberia, and was the first to give a figure of the egg; and it is said to breed in societies from Bjornenas, north of Egedesminde, to the northward (Newton, B. of Greenland). There must, however, be many other breeding-places within the arctic circle; for the species is abundant in the north, and is not uncommon on our coasts, principally on the west, in autumn. Passing along the coasts of Western Europe, it occurs as a straggler in the interior of the continent, and visits the Mediterranean as far east as Sicily and Malta; goes down the west coast of Africa, where Capt. Shelley obtained it off Fantee; crosses the equator, and reaches Walwich Bay in lat. 23° S., where Andersson shot two specimens, one of which, a bird of the year, is in my collection. With this proof of its traversing the tropics it is no longer remarkable that it should have been obtained at Moulmein, on the coast of Tenasserim, in lat. 16° 22′ N., by Major Tickell, as recorded by Mr. Blyth; the singular thing was, that the specimen in question should prove to be an adult and not a bird of the year, like all the other visitors to the south which I have examined*. There is a specimen in the plumage of the first year in the collection of Messrs. Salvin and Godman, obtained by Mr. Cockerell off Cape York, the northern extremity of Australia. On the east coast of America it occurs from Labrador as far south as New York and Pennsylvania, beyond which it has not yet been traced. On the west coast there is no positive record beyond two instances on the Prybilov Islands; but Mr. Gervase Mathew's description of a Skua observed by him at Valparaiso and Coquimbo seems to refer to this species, respecting whose winter range we must wait for further details.

STERCORARIUS CREPIDATUS. (Richardson's Skua.)

Stercorarius (*Le Stercoraire*), Brisson, type of genus *Stercorarius*.

Catharacta cepphus, Brünn. Orn. Bor. p. 36 (1764).

Catharacta coprotheres, Brünn. Orn. Bor. p. 36 (1764), dark form.

The Black-toed Gull, Pennant's Brit. Zool. ii. p. 419, tab. 2 (1768).

Larus crepidatus, Banks, Hawkesworth's Voy. ii. p. 15 (1773); Gmelin, Syst. Nat. p. 602 (1788); Latham, Ind. Orn. p. 319 (1790); Meyer & W. Tasch. deutsch. Vög. ii. p. 493 (1810); Scoresby, Arctic Reg. i. p. 534 (1820).

"*Larus parasiticus*, Linn." Boddaert, T. des Pl. Enl. no. 991 (nec Linn.).

Lestris crepidatus, Tem. Man. d'Orn. p. 515 (1815).

Stercorarius crepidatus, Vieillot, N. Dict. Hist. Nat. xxxii. p. 155 (1819).

Lestris parasitica, F. Faber, Prodr. Is. Orn. p. 105 (1822); Brehm

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* Since writing the above I have had the opportunity of referring to Major Tickell's coloured drawing of this identical specimen, which proves it to be an *immature bird* after all! Mr. Blyth's error in stating it to be an adult was doubtless owing to the want of any specimens for comparison at that time.

& S. Beitr. Vögelk. iii. p. 853 (1822); Naum. Vög. Deutsch. x. p. 506, pl. 272, 273 (1840).

Cataractes parasiticus, Fleming, Brit. An. p. 138 (1828); Selby, Ill. Brit. Zool. ii. p. 520 (1832).

Lestris richardsonii, Swain., Sw. & Rich. F. Bor.-Am. p. 433, pl. 73 (1831); Macgill. Brit. B. v. p. 492 (1852); Audubon, B. Am. vii. 190, pl. 452 (1844); Gould, B. of Eur. v. pl. 441 (1837); Meyer, Ill. Brit. B. vii. p. 177 (1857).

Lestris parasita, Keys. & Bl. Wirb. Eur. p. 240 (1840); Midd. Sib. Reise, p. 241 (1853).

Stercorarius parasiticus, Schaeff. Mus. Orn. p. 62, pl. 37 (1789); De Selys-L. Fn. Belg. p. 155 (1842); G. R. Gray, List B. Br. Mus. iii. p. 167 (1844); Gray, Gen. Birds, iii. p. 653 (1849); Lawr. Baird's B. N. Am. 839 (1858); Blakiston (B. N.W. A.), Ibis, 1863, p. 152; Degl. & G. Orn. Eur. ii. p. 397 (1867); B. Ross, Nat.-Hist. Rev. 1862, p. 289; Coues, Pr. Phil. Ac. 1863, p. 132; Newton, Ibis, 1865, p. 510 (Spitzbergen); Andersson, B. of Damara Land, p. 357 (1872); Gould, B. G. Brit. v. p. 80 (187); Hume, Stray Feathers, p. 268 (1873) (Sindh); Buller, B. New Zealand, p. 268 (1873); Coues, Rep. Prybilov Is. no. 541 (1874); Sharpe, Voy. 'Erebus and Terror,' i. App. p. 32 (1875); Newton, B. Greenland, p. 107, Arct. Man. (1875).

Lestris parasiticus, Bp. Consp. Av. ii. p. 208 (1857).

Lestris parasiticus, var. *coprotheres*, Bp. Consp. Av. ii. p. 209.

Lestris thuliaca, Preyer, Reise n. Island (1862).

Lestris parasitus, Th. v. Heuglin, Ibis, 1872, p. 65.

Lestris spinicaudus, Hardy, Rev. et Mag. Zool. 1854, p. 657.

Stercorarius spinicauda, Layard, B. S. Af. p. 366 (1867).

Stercorarius parasitica, Dall & Bannister, Tr. Chic. Ac. i. p. 303 (1869) (Alaska).

Stercorarius asiaticus, Hume, Stray Feathers, p. 269 (1873) (Sindh).

Lestris boji, schleepii, benickii, Brehm, and *Stercorarius tephras*, Malmgren, are believed to be this, whilst *Lestris brachyrhynchus* and *L. microrhynchus*, Brehm, are ascribed to the next; but it would be a mere waste of time to verify Brehm's supposed species.

Dr. Coues follows those authors who have chosen to divert Linnæus's name of *L. parasiticus* to this species—a supposition utterly negatived by the description in the Syst. Nat. p. 226, which is based upon that in his 'Fauna Suecica,' p. 55, No. 156. Nothing could well be clearer than his statement:—"rectricibus duabus intermediis *longissimis*," which can only apply to the Buffon's or Long-tailed Skua; but, as if to make assurance doubly sure, Linnæus adds "remiges nigræ, *rachi* 1. 2. *nivea*." The natural inference from drawing especial attention to the fact that the *shafts* of the *first* and *second primaries* are *white*, is clearly that those of the *other* primaries are *not* white. Now the particular characteristic by which "Richardson's Skua," may be distinguished at any age beyond that of the nestling, is that the shafts of the other primaries are conspicuously lighter than in those of Buffon's Skua, in which *only* those of the first and second primaries are white, those of the third and successive primaries being dark. I am indebted to Mr. R. Collett, of Christiania, for pointing out to me, some years since, this excellent distinction. The *L. parasiticus* of Linnæus is therefore not *S. crepidatus*, but the "Buffon's Skua;" and so is, according to my view, *Catharacta parasiticus* of Brünnich; but it is needless to discuss the latter name, as it is out of date.

Dr. Coues considers that the *Larus crepidatus* of Gmelin is in all probability based upon the young of the Pomatorhine Skua, to which Brisson gave the name of *Stercorarius striatus*. It is true that Gmelin (who translated from Latham) identifies *S. striatus* of Brisson with his *L. crepidatus*; but although *S. striatus* is certainly a young Pomatorhine, it was by no means easily recognizable by the naturalists of that day; and, moreover, Gmelin correctly cites in the first place *Catharacta cepphus*, Brünn., which is certainly this species, and in the third line refers to "Le Labbe ou Stercoraire" of Buffon, whose figure ('Planches Enluminées,' No. 991) is an excellent one, besides giving an accurate description of the tail-feathers ("rectricibus duabus intermediis longoribus"); he also refers it to the "Black-toed Gull" of the 'Brit. Zool.,' which is clearly this species. This would be quite sufficient to impose Gmelin's name of *L. crepidatus* upon "Richardson's Skua;" but the name did not actually originate with Gmelin. On referring to Hawkesworth's 'Voyages' (1773), vol. ii. p. 15 (not vol. i. p. 15, as erroneously cited by Latham, and of course duly copied by Gmelin, without reference), we find in the narrative of Lieut. Cook's voyage in the 'Endeavour' that "on the 8th October 1768 (when a little to the south of the Cape-Verd Islands) Mr. Banks [afterwards Sir Joseph Banks] shot the Black-toed Gull not yet described according to Linnæus's system; he gave it the name of *Larus crepidatus*." The Black-toed Gull is described in Pennant's 'British Zoology,' vol. ii. p. 419 (1768); and plate 2 is an excellent representation of a "Richardson's Skua" of the year, the feet of this species at that age having the upper part of the webs yellowish, and the posterior portion black, giving the bird the appearance of being "shod" or "sandalled," whence Banks's somewhat quaint Latin rendering. I think it probable that the bird was identified from Pennant's description and figure; for in the MS. in the British Museum of Solander, who was also in the 'Endeavour,' there is indirect evidence of that work having been on board; but as Banks gave no description, it is perhaps safest to cite Gmelin as the authority for the name.

It is now well known that there are two very distinct plumages to be found in birds of this species, even in the same breeding-places—an entirely sooty form, and one with light underparts,—and that white-breasted birds pair with whole-coloured birds as well as with those of their respective varieties. If this species is "dimorphic," the offspring of one particoloured and one whole-coloured bird ought to resemble one or other of their parents without reference to sex; my examination of upwards of a hundred specimens from widely different localities and in all stages inclines me to the belief that this is not the case, and that the young of such union will be intermediate, whilst the offspring of two similar parents will "breed true." This point can only be solved by some ornithologist who will devote his attention to a colony during the breeding-season, observing the produce of all these unions, and, if possible, marking the nestlings before they take wing; perhaps some of our Scotch friends will take the hint.

That the sooty plumage is not merely a sign of immaturity is shown by the long tail-feathers, and by the burnished tinge of the acuminate ones on the nape.

It is worthy of notice that in Spitzbergen, its most northern breeding-ground, neither Dr. Malmgren nor Professor Newton found a single example of the dark whole-coloured form; all those which Admiral Collinson's and Dr. Rae's Expeditions brought home from the far north are also white-breasted specimens, which looks as if the dark form was a more exclusively southern one.

In the white-breasted birds the striations on the underparts decrease with age until little more than a pectoral band remains; this, again, becomes narrower until in some specimens it entirely disappears and the bird is white from the chin to the abdomen.

This species has the most extended range of any member of the family. Parry found it up to lat. 82° 2′ N.; and it breeds throughout the arctic and subarctic regions, as far south as the islands of the north of Scotland; and Thompson records it as having nested near Achil Island on the west of Ireland. I should not be surprised to learn that there is some beeeding-place along the western shores of France; for both old and also very young birds occur at Málaga early in August. Some go higher up the Mediterranean; but others, principally the young, continue their course along the west coast of Africa, to Walwich Bay and as far as the Cape of Good Hope; and in those waters they pass the months of what is our winter, compelling the Terns and the small Gull (*L. hartlaubii*) to disgorge their prey. From the altered appearance which they present in their progressive stages of plumage at a time when European naturalists have lost sight of them, an individual from the vicinity of St. Helena received the name of *S. spinicauda*. Careful examination of a series of specimens from the Cape of Good Hope, where Mr. E. L. Layard only observed them from December to February, showed that all were in the act of losing and renewing the central tail-feathers and the outer primaries, which are the last to be moulted; and although at the first glance the birds have a somewhat distinct look, yet there can be no doubt whatever of their being our northern species. Most that I have seen are birds of less than a year old, although this immaturity is less noticeable in the dark-plumaged birds than in the lighter ones; in none, however, are the central tail-feathers fully developed, and most are still partially in the quill-sheath. One specimen, evidently obtained just before the northward migration, is absolutely the same as a bird of only two months older from the Färoes. It is to be presumed that *S. crepidatus* goes up the east coast of Africa, as Mr. Allan Hume obtained it (naming it *S. asiaticus*), and observed many along the coast of Sindh, the Gulf of Oman, and between Guader and Bombay.

Returning to the Atlantic, we find it along the North-American coast; and Solander, in his MS., describes, under the names of *L. fuliginosus* and *L. nigricans*, two specimens of this species obtained in the harbour of Rio de Janeiro on December 4, 1768, thus giving it a claim to be included in the list of the Neotropical Laridæ so ably worked out by Messrs. Sclater and Salvin (P. Z. S. 1871, p. 564). South of Rio there is no record of its occurrence on the east coast of America; but I can only refer to this species the example obtained by Mr. Buller at Horowhenua in the Province of Wellington, New Zealand, on April 30, 1864. His general description suits *S. crepidatus*; and he expressly states that the shafts of the primaries are *white*, the characteristic which particularly serves to distinguish it from Buffon's Skua, with which he has identified it. At the time that I examined the specimen in question I was not aware of this distinctive feature: the skin also had been badly preserved; and, to make matters worse, the plumage was so worn and abraded that it is a marvel that the bird was able to fly at all.

On the west coast of America it is only recorded as occurring at the Prybilov Islands and in Alaska; but Mr. Gervase Mathew, R.N., informs me that when at Callao in April 1873, in H.M.S. 'Resolute,' he observed many small Skuas in various states of plumage, and attributed them (correctly no doubt) to this species, which he had often observed previously on the English coast.

STERCORARIUS PARASITICUS. (Long-tailed or Buffon's Skua.)

Le Stercoraire à longue queue, Buffon, Pl. Enlum. 762.
Stercorarius longicaudus, Brisson, vi. p. 155 (1760).
Catharacta parasitica, Brünn. Orn. Bor. p. 37 (1764).

Larus parasiticus, Linn. Syst. Nat. p. 226 (1766), Fauna Suec. 55. no. 156 ("*rectricibus duabus intermediis longissimis.*"); ? Müller, Zool. Dan. Prod. 166 (1774); Phipps, Voy. N. Pole, p. 187 (1774); Gm. Syst. Nat. p. 601 (1788); Scoresby, Arctic Regions, i. p. 534 (1820).

Catharacta parasitica, O. Fab. F. G. p. 103 (1780).

Catarracta parasitica, Retz. F. Suec. p. 160 (1800).

Catarractes parasita, Pallas, Z. Ros.-As. p. 310 (1811).

Lestris parasitica, Illiger, Prod. p. 273 (1811); Sw. & Rich. F. Bor.-Am. p. 430 (1831); Macgill. Brit. B. v. p. 503 (1852).

Lestris parasiticus, Temm. M. d'Orn. p. 512 (ed. 1815), p. 796 (ed. 1820), p. 501 (ed. 1840); Jenyns, Brit. Vert. An. p. 283 (1835); Gould, B. of Eur. v. pl. 442 (1837); Audubon, B. Am. vii. 192, pl. 452 (1844); Meyer, Ill. Brit. Orn. vii. p. 174, pl. 314 (1857).

Stercorarius longicaudus, Vieill. N. Dict. Hist. Nat. xxxii. p. 157 (1819); Newton, Ibis, 1865, p. 511 (Spitzbergen); Degl. & Gerbe, Orn. Eur. ii. p. 399 (1867).

Lestris crepidata, Brehm & S. Beiträge z. Vögelkunde, iii. p. 861 (1822); Naum. Vög. Deutsch. x. p. 534, pl. 274 (1840).

Lestris buffonii, Boie, Meyer & W. Tasch. iii. p. 212 (1822); Middendorff, Sib. Reise, ii. p. 241, taf. xxiv. fig. 2 (1853).

Stercorarius cepphus, Steph. in Shaw's Gen. Zool. xiii. pt. i. p. 211, pl. 23 (fig. nec descrip.) (1826); B. Ross, Nat.-Hist. Rev. 1862, p. 289, Blakiston, Ibis, 1863, p. 152 (Mackenzie River).

Lestris lessoni, Degl. Mém. Ac. R. Lille, p. (1838); Schinz, Eur. F. p. 392 (1840).

Lestris cephus, Keys. & Blas. Wirb. Eur. p. 240 (1840); Bp. Consp. Av. ii. p. 209 (1857).

Stercorarius longicaudatus, De Selys-L. F. Belg. p. 156 (1842); Degl. Orn. Eur. ii. p. 298 (1849); Newton, B. Greenland, p. 107 (1875).

Stercorarius cephus, Gray, Gen. Birds, iii. 1849, p. 653; Schlegel, Mus. P.-B. *Lari*, p. 49 (1863); Gray, Hand-List, iii. p. 110 (1871).

"*Lestris longicaudatus*, Briss.," Thomps. Nat. Hist. Ireland, iii. 399 (1851).

Lestris hardyi, Bonap. Tabl. d. longipen. Compt. Rend. xlii. 1856, p. 770; Consp. Av. ii. p. 210 (1857).

Stercorarius buffoni, Coues, Proc. Phil. Acad. 1863, p. 136; Dall & Bann. Tr. Chic. Ac. i. p. 304 (1869) (Alaska); Coues, Prybilov Isl. (1874); Irby, Orn. Str. Gibraltar, p. 216 (1875).

Lestris longicaudata, T. v. Heuglin, Ibis, 1872, p. 65 (Novaya Zemlya).

In treating of the preceding species I have already shown that Linnæus's description of his *L. parasiticus* can only apply to this species, which may always be distinguished by its very long central tail-feathers and by having, even in immature plumage, the shafts of only the first and second primaries white, those of the others being dusky. In its adult state, the Long-tailed Skua has also the under tail-coverts, abdomen, and flanks of a sooty brown; the tarsi also are yellowish olive, whilst in adult *S. crepidatus* the legs are black. I have seen but few immature specimens, all birds of the year, obtained on their autumnal migration; they are of a nearly uniform sooty colour, with the usual pale edgings to the feathers characteristic of the first plumage. This species is found from Novaya Zemlya to Spitzbergen, and, south of these points, throughout the whole circuit of the arctic regions. Von Middendorff first discovered its breeding-places on the Taimyr and Bogonida, in Siberia; the late John Wolley found it nesting on the Lapland fells; Sir John Richardson obtained nestlings in Melville Peninsula; Mr. Bernard Ross observed it at the mouth of the Mackenzie River; it occurs in the Prybilov Islands; and Dall and Bannister found it in Alaska, the extent of its recorded range on the Pacific coast. By far the rarest of the family as an autumnal visitant, it ranges along our shores and those of Western Europe as far south on the Straits of Gibraltar and Morocco, beyond which there is no trace of it, whilst on the east coast of America it does not seem to go south of lat. 40° N. I have already pointed out that Mr. Buller's supposed example of this species from New Zealand must be referred to *S. crepidatus*. Professor Peters, of Berlin, has kindly informed me that the type specimen in that Museum of *Lestris hardyi*, Bonaparte, has the shafts of all except the first two primaries dusky; and on that ground I presume it to be a young bird of this species.

The specimen in question is *said* to have been obtained "between the Philippines and Sandwich Islands"—a considerable extension to the range of the species so far as it is at present known.

In concluding my remarks on a family whose members are principally Arctic in their habitat, it would be a great omission if I failed to acknowledge my indebtedness to Professor Newton's comprehensive remarks on the Arctic fauna in these 'Proceedings,' in 'The Ibis,' and in the 'Arctic Manual.' The whole available information respecting the *northern* range of the Skuas is given in a condensed form, accompanied by most important references; and to these originals, especially to the paper on the Birds of Spitsbergen in 'The Ibis,' 1865, I would refer those who require more details than I have thought it necessary to give in the present article.

April 4, 1876.

Prof. Newton, F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of March 1876:—

The total number of registered additions to the Society's Menagerie during the month of March was 91. Of these, 65 were acquired by presentation, 16 by purchase, 3 by birth, and 7 were received on deposit. The total number of departures during the same period, by death and removals, was 111.

The most noticeable additions during the month of March were as follows:—

1. A male Brown Monkey (*Macacus brunneus*, Anderson), transmitted home to us from Siam as a present by Mr. T. G. Fermor Hesketh, F.Z.S.

This Monkey was presented to Mr. Hesketh by the King of Siam, and is, no doubt, from that country. It agrees generally with Dr. Anderson's figure (P. Z. S. 1872, p. 203, pl. xii.), but is rather darker in colour.

Dr. Anderson tells me he has now come to the conclusion that, in spite of what he stated (P. Z. S. 1874, p. 652), his *Macacus brunneus* and *M. arctoides* of Is. Geoffr. are referable to the same species. Dr. Anderson also takes Blyth's view *, that *M. speciosus* of Geoffr. St.-Hil. et F. Cuv. properly applies to this Siamese Monkey, and not to the Japanese species figured under that name by Temminck. This, however, though probable, I may observe, cannot be positively proved, as the name was established on a drawing, and there is no existing type. I think, therefore, it would be better to use *Macacus arctoides* (as the oldest name that can be certainly attributed to this animal), and to call the Japanese species, which I have lately figured (P. Z. S. 1875, pl. xlvii.), *M. fuscatus* (as proposed by Blyth *l. s. c.*), rejecting the term *speciosus* altogether.

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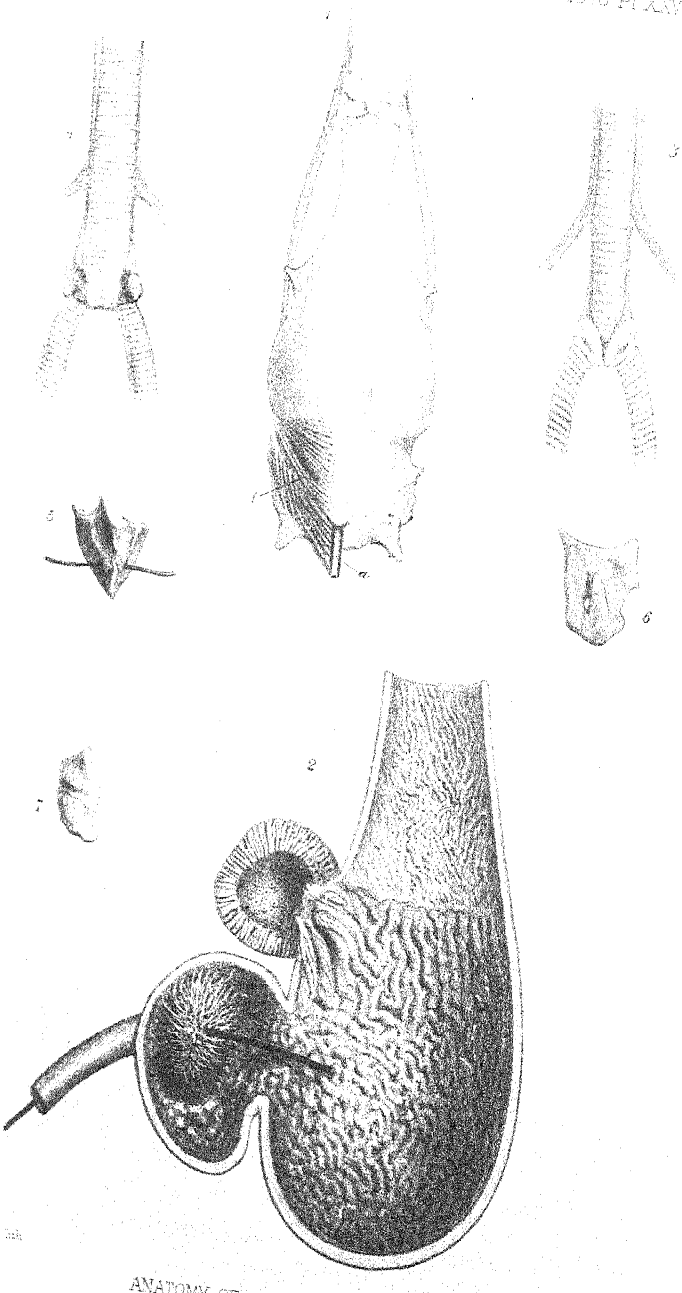
* "Mammals of Burmah," in J. A. S. B. No. i. 1875, p. 6.

P. Z. S. 1876. Pl. XXVIII.



J. Smit lith.

ANATOMY OF PLOTUS ANHINGA.

Hanhart imp.

skin had been destroyed by moth. The present was therefore the first authentic introduction of the *Surnia ulula* into this country. The Hawk-Owls of America and Europe were, Mr. Sharpe said, scarcely distinct species, but tolerably recognizable races.

The following Papers were read:—

1. Notes on the Anatomy of *Plotus anhinga*. By A. H. Garrod, M.A., F.Z.S., Prosector to the Society.

[Received March 31, 1876.]

(Plates XXVI., XXVII., XXVIII.)

The Darter is one of those birds whose anatomy, with the exception of its skeleton, is comparatively little known; I therefore take the present opportunity of describing the organs and some of the most important muscles of *Plotus anhinga* from the two specimens which were recently living in the Society's collection, and which, from my prosectorial advantages, it has been my good fortune to be able to dissect.

On December 28th, 1872, the Society became possessed, for the first time, by purchase, of a male specimen of *Plotus anhinga*, which died on the 17th of this month, with general jaundice and distention of the gall-bladder from obstruction of the common bile-duct. The second specimen, a female, was purchased on the 30th of September, 1875; it was never quite healthy, and died on the 7th of February, without any special organic lesions, but with a dropsical condition of the subcutaneous areolar tissues, frequently found in Steganopod birds. It is this second specimen which I first dissected; and the other coming to hand, opportunely for me, has enabled me to verify my observations.

Pterylographically, there is nothing for me to add to the results arrived at by Nitzsch*. The skin is not in the least pneumatic, in which respect it contrasts greatly with *Sula* and *Pelecanus*, and agrees with *Phalacrocorax*.

With reference to the anatomy of its circulatory organs, it is to be noted that *Plotus anhinga* possesses only a single carotid artery, the left. In *Sula bassana*, *Phalacrocorax carbo* and *P. lugubris*, *Fregata aquila*, and *Phaethon* there are two. In *Sula fusca* (a specimen in very bad immature plumage from Port Lemon, Porto Rico) the left carotid only exists, as also in *Pelecanus rufescens* and *P. onocrotalus*.

As to the respiratory organs, from Plate XXVIII. fig. 3 it can be seen that the syrinx is in no way peculiar, a single pair of intrinsic lateral muscles being present. By the side of it I have figured the lower portion of the windpipe of a male Gannet (*Sula bassana*), in which a pair of fatty bodies are developed just above the bifurcation of the bronchi, the like of which I have not elsewhere seen.

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* Pterylography, Ray Society's Translation, edited by P. L. Sclater, F.R.S., p. 151.

Osteologically *Plotus anhinga* deserves some special attention. Brandt* in his valuable memoir on avian anatomy has fully described and figured the skeleton. Nevertheless from his drawing of the vertebræ of the cervical region it is evident that he was not thoroughly acquainted with the peculiarities of their mutual articulation.

Eyton† describes briefly the osteology of *Plotus novæ-hollandiæ*, but does not give figures. The specimen he refers to is in the College-of-Surgeons' Museum (No. 1179 A). His drawing of *Phalacrocorax cristatus*‡, however, makes it apparent that he fully realizes the peculiarity of the mutual relationships of the cervical vertebræ in its close allies.

W. Donitz§ draws attention to a peculiarity in the cervical region of *Plotus levaillantii* which will be referred to further on. This peculiarity is not represented in Brandt's figure of *P. anhinga*; and it is not to be found in either of the Society's specimens, one being at least three and a half years old.

In speaking of *Phalacrocorax cristatus* Mr. Eyton remarks, "The tubercle on the upper edge of the occipital bone has a pointed, movable, triangular process attached to it, which I suspect has also been the case with my specimen of *Plotus*, but has been lost."

In the Society's female specimen there is a fibro-cartilaginous similarly situated process, not more than one sixth of an inch long, which is ossified in the evidently older male. In his notes on the anatomy of the Cormorant, Hunter tells us‖ that "a small bone, about an inch long, passes back from the os occipitis and gives origin to the temporal muscle, which is very strong." The same bone in the Darter, although comparatively not so long, performs the same function, the superfical temporal muscles meeting behind the skull along the median raphe, which becomes ossified to form the above-mentioned bony style in the adult bird. (See Plate XXVIII. fig 1 *a*.)

Before commencing the description of the cervical articulations of the Darters, it may be mentioned that the same condition is observed, only in a less marked degree, in the Cormorants, and still less in the Gannets and Pelicans.

The first eight cervical vertebræ (including the atlas and axis), when articulated together in such a way that all the articular surfaces are in their proper relations one to the other, form a continuous curve with a strong concavity forwards. So considerable is this curve, that when the beak of the bird is horizontal the axis of the peculiarly long eighth vertebra is parallel to that of the skull, or very nearly so. The curve is not a part of a circle, but is one which gradually augments in acuteness from above downwards, its most considerable development being between the 7th and 8th vertebræ, which are consequently articulated at a considerable angle with one another, more strongly marked than that between the 6th and 7th, and this, again, more decided than that between the 5th and 6th, and so on.

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* Mémoires de l'Acad. Imp. des Sciences de St. Pétersbourg, tom. v. 6ème Série, Sect. d. Sc. Nat. 1839.

† Osteologia Avium, p. 218.

‡ *Loc. cit.* pl. v. f. 1.

§ Archiv für Anat. u. Physiol. 1873, p. 357.

‖ Essays and Observations, edited by Prof. Owen (1861), vol. ii. p. 328.

The 8th and 9th vertebræ articulate so as to form an angle exactly the opposite in direction—namely, with its genu directed forwards instead of backwards. The same is the case with the 9th and 10th, the 10th and 11th, the 11th and 12th, the 12th and 13th; more slightly so between the 13th and 14th, and the 14th and 15th; whilst the 15th and following until the last (the 20th), which with the one above it carries imperfect ribs, form almost a straight line with one another, being slightly bowed, with the convexity directed backwards.

With the exception of the atlas and the 6th and 7th, the cervical vertebræ are peculiarly elongate, the 8th being more so than the others, as may be seen in Plate XXVI. fig. 1.

Donitz figures a pair of accessory bony bridges on the dorsal surface of the vertebra following the most lengthy one, which must evidently therefore be the 9th. He, however, speaks of it as the 8th, which seems to me to be an error depending on the omission of the consideration of the atlas, because in *Plotus anhinga* (both from Brandt's figure and my specimens) it is most certainly the 9th, as it is in *Plotus novæ-hollandiæ*, *Phalacrocorax carbo*, and *P. lugubris*. I have, however, not seen *Plotus levaillantii*.

Donitz attributes the peculiar kink in the neck of the Darters, which it is impossible to obliterate without lacerating the surrounding muscles, to the presence of the bony bridges he describes; in this, however, he is mistaken, it depending on the above-mentioned peculiarity in the 8th cervical vertebra, by which it is angularly articulated with the 7th and 9th vertebræ, the upper genu being posterior, and the lower anterior. In further verification of this, it may be stated that in *P. anhinga* the bony bridges do not exist, and yet the kinking is most strongly marked.

Myologically the cervical region of the Darter is very peculiar, on account of the great concentration of its muscular mechanism towards the thoracic end of that segment of the body, the tendons from them running lengthy courses up the neck. The anterior and the posterior cervical muscles will be considered separately.

Anterior cervical region.—Normally in birds the *longus colli anterior*, or great front flexor muscle of the neck, commences as a series of thin tendinous slips from the middle of the bodies of the first two or three vertebræ which carry complete ribs (true dorsals). The fibres diverge and ascend in such a manner that they form a bilateral median mass acutely triangular at its lower end. They receive continual accessions from the bodies and hæmapophyses of the cervical vertebræ, ending in slips which are attached, successively, to the apices of the anterior transverse processes three or four higher than the vertebræ whence they sprang. Through the whole length of the cervical region they are of very similar mass, and therefore help to maintain the otherwise fairly uniform diameter of the vertebral column *.

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* *Vide* Owen on *Apteryx*, Trans. Z. S. vol. iii. pl. 33, p. 310.

In *Plotus* this uniformity is considerably disturbed, irrespective of the above-described kink, by the excessive development of the *longus colli* in its lower almost interthoracic portion, as well as, though to a less degree, by the enlargement of the *longus colli posterior* behind.

In *Plotus anhinga*, as above stated, there are 20 cervical vertebræ. A small slip of the *longus colli* arises from the body of the third dorsal vertebra, which is inserted into the transverse process of the 17th cervical. Above, and in contact with this, is another similar slip to the 16th cervical. From the bodies of the 2nd and 1st dorsal vertebræ, as well as from the antero-median portions of the six lower cervical vertebræ, a large muscle arises on each side, in layers (somewhat resembling the layers formed by the basally expanded petioles of an onion bulb)—the lower being partially enclosed in the upper—which ultimately form a bipenniform mass with a tendon running axially through it and continually receiving additions in the form of outer coverings of tendinous tissue arising from the enclosing muscles, till it forms a strong single tendon which courses up the front of the neck, close to the middle line on each side, to be inserted into the downward-directed, peculiarly long hæmapophysial spine of the 8th cervical vertebra, and gives off slips, on its way up, to the serially homologous processes of the 9th and 10th vertebræ. A similar tendinous slip to the 11th vertebra has an independent origin from the bodies of the 15th and 16th vertebræ, internal to the main muscular mass, which is almost the size of a lemon, and with its fellow of the opposite side, of much the same shape, filling up and projecting beyond the slight anterior concavity above mentioned, formed by the mutual articulations of the 15th, 16th, 17th, 18th, and 19th cervical vertebræ. (In Plate XXVI. figs. 1 & 2, these different details are clearly shown.)

Posterior cervical region.—Here there is an exaggerated development of muscle in the juxta-thoracic part, opposite the similar enlargement in front, although it is not so considerable behind. The *longus colli posterior* is the muscle which is excessively developed. It becomes differentiated from the posterior dorso-spinal mass opposite the 14th and 15th cervical vertebræ to run up the neck in the form of a fleshy belly which receives additional origins, in the form of muscular slips, from the vertebræ as high as the 9th cervical. Where the slip from the 10th vertebra (which is a small one) joins it, the muscle becomes tendinous, forming a rounded cord, to the inner side of which the large fasciculus from the 9th vertebra is attached.

A reference to the account given above of the disposition of the vertebræ in this region will make it evident that the tendon of the *longus colli posterior* must make a considerable backward turn opposite the transverse line of articulation between the 8th and 9th cervicals—because there the two bones meet at a considerable angle, *with the genu directed forwards.* This being the case, some special mechanism is essential to prevent the tendon from breaking away from the vertebral column when the muscle with which it is associated contracts. In fact, a pulley has to be formed round which the tendon may turn in the same manner that at the knee, in birds, the *biceps cruris* is able to act upon the fibula from a point situated some way down it, because it is bound close to the greatly bent knee-joint by the well-known sling-band in that region. In Plate XXVI. figs. 1 & 2, the sling-band here described is clearly shown.

A similar sling-band is found in the posterior cervical region of those birds which have any great backward curve of the neck, it in the Gannets being also associated with the 9th vertebra. It is nothing more than a specialization and strengthening of the aponeurosis which is always found covering the muscles, opposite the place where the strain occurs. In *Phalacrocorax carbo* the general sheath is strong, and no specialized band can be distinguished.

In *Plotus anhinga* this sling-band is attached at its inner end, with its fellow of the opposite side, to the middle line of the posterior surface of the neural arch of the 9th vertebra, about halfway between its proximal and distal extremities; whilst at its outer end it is fixed to the tubercle which is situated just outside the upper articular process of the same vertebra, a backward and slanting loop of tendinous tissue joining the two (*vide* Plate XXVI. figs. 1 & 2).

It is the ossification of this just-described tendinous loop which constitutes Donitz's bridge in *P. levaillantii* and *P. novæ-hollandiæ*. In neither of the Society's specimens of *P. anhinga*, nor in that figured by Brandt, nor in a specimen of the same species seen by Donitz himself, is this bridge ossified. It may therefore be that in *P. anhinga* it remains tendinous; or, less probably, it has happened that the four specimens inspected have none of them been adult birds. One is at least 3½ years old, we know.

Through this bridge, as has been briefly described by Donitz, from a dried specimen, the tendon of the *longus colli posterior* passes—which it does before it receives the considerable fleshy fasciculus originating from the neural arch of the ninth vertebra, as is rendered evident in Plate XXVI. figs. 1 & 2.

The tendon, augmented by fibres from the just-mentioned additional origin, passes up the back of the neck, side by side with its fellow, to end by being inserted into the posterior surface of the lower articular process of the axis vertebra, it, in its course, sending small tendinous slips to the corresponding parts of the third and fourth cervical vertebræ. The tendon is peculiar in being ossified where it is opposite the bodies of the vertebræ with which it is related, and supple at the joints, which makes it appear to be composed of alternate bony and fibrous elements when it is removed from the body. From the fifth, fourth, and third vertebræ short muscular fibres ascend to join the corresponding portions of the main tendon in single penniform series.

It is nearly always the case in avian anatomy that the inner fibres of the cervical portion of the *longus colli posterior* muscle become differentiated to form the *digastrique du cou* of Cuvier, better known to us as the *biventer cervicis*, a muscle one peculiarly interesting modification of which, in the genus *Ceryle* among the Alcedinidæ, has been described and figured by Dr. Cunningham in the Society's 'Proceedings'[*]. This, by the way, I may mention, I have had the opportunity of fully verifying. Meckel, in his 'General Treatise on Comparative Anatomy,' tells us[†] that he found it at its minimum of development in the Gallinæ, the Goose, and the Cormorant. In a specimen of *Sula fusca*, as well as in *Phalacrocorax carbo*, it is present, but extremely small, I find. It is entirely absent in *Plotus anhinga*, the *longus colli posterior* (*cervicalis ascendens*, Meckel) entirely ceasing at the lower margin of the axis vertebra, in the tendon above described.

There are other myological features deserving of special notice in the thoracic and crural regions of the Darters.

The *great pectoral* muscle is composed of two independent layers:—a superficial large one, arising from the inferior border of the sternum, its carina, and from the outer border of the furcula; and a deep one from the upper two thirds of the deeper part of the carina, superficial to the *pectoralis secundus*, and from the symphysial half of the outer border of the furcula. The superficial layer is inserted by a broad linear attachment to the pectoral ridge of the humerus, whilst the deep layer ends in a rounded tendon which commences at the axillary margin of the triangular muscle, with which it is associated, and receives the fibres of the remainder of the muscle in its course to its attachment into the lower end of the pectoral ridge of the humerus, beyond the insertion of the lowest fibres of the superficial layer. In Plate XXVII. this arrangement is clearly indicated. A condition exactly similar to this is observed in *Phaëthon*, *Pelecanus*, *Sula*, the Cathartidæ, all the Storks, and the Petrels, and in no other birds as far as I am aware. In *Phalacrocorax* it is not easily recognized.

As in *Phalacrocorax* and *Phaëthon*, but not in *Sula* or in *Pelecanus*, the *biceps* muscle of the arm sends a fleshy slip to the middle of the patagial tendon of the *tensor patagii longus* (Plate XXVII. *b.s*).

No trace of the *expansor secundariorum*[‡] muscle could be detected.

As in all the other Steganopods, the *tensor fasciæ* of the thigh does not cover the *biceps cruris* in the least.

The *ambiens* is of fair size; it deeply grooves the large ossified patella; and some of the fibrous ligament overlapping this groove shows traces of ossification; so that in aged birds the groove may be converted into a foramen, as is always the case in *Phalacrocorax*, where the thus formed foramen is far from superficial (*vide* Plate XXVIII. figs. 5, 6, & 7). In a specimen of *Pelecanus rufescens* the *patella* was not ossified.

The *semitendinosus* is very large, composed of parallel fibres, and without any accessory head developed to join it. The *femoro-caudal* also, as in all other true Steganopods, lacks an *accessorius*; it closely resembles that muscle in *Sula* and *Pelecanus*, being separated from the *obturator externus* by a well-marked interval, which is not the case in *Phalacrocorax**. It is to be remembered, as I have had the opportunity of stating elsewhere†, that in *Fregata aquila* the *semitendinosus* is entirely absent, as in the Accipitres, whilst in *Phaëthon* it has an accessory head as well as a considerable bulk itself, these facts tending strongly to verify Brandt's division of the Steganopods‡ into three well-differentiated groups, of two of which the two above-named genera are the only examples.

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[*] P. Z. S. 1870, p. 280.

[†] French edition, Paris, 1829-30, vol. vi. p. 11.

[‡] *Vide ante*, p. 193.

The alimentary canal of the Darter presents features of especial interest, as in its stomach there is a modification in the structure of the proventriculus not referred to in zoological works generally. It is fully described by Mr. Macgillivray in Audubon's 'Ornithological Biography' §, where an excellent figure illustrates the account. Mr. Macgillivray also accurately describes most of the other viscera. He, however, omits to refer to the hairy mat in the second stomach, which latter viscus, he strangely says, is soft and smooth inside. The observations here made, which are in accordance with those of Mr. Macgillivray, cannot be considered *de trop*, as the extremely abnormal conformation he describes required verification before it could be accepted as not being merely an individual peculiarity.

The *tongue*, as an independent organ, does not exist. It is very small in all Steganopods, but free at its anterior extremity; smallest proportionally in *Pelecanus*. In *Plotus*, however, it is not free at its apex, it forming merely a longitudinal groove along the middle of the floor of the mouth, and ending abruptly behind by a small transverse slightly projecting ridge, 2¼ inches in front of the *rima glottidis*, which is evidently the rudiment of the base of the organ. The hyoid cornua, 1½ inch long, running in the faucial membrane, here meet and blend.

There is no *crop*; the œsophagus, however, is very dilatable. The *proventriculus* does not form a zone, as is the rule; nor does it form a patch, as in *Struthio*, *Rhea*, *Chauna*, and a few other birds; but it forms a special gland-cavity into which the individual constituents of the organ open. This cavity communicates with the digestive tube by a small orifice which is situated on the right side of the stomach, just below the commencement of the yellow dense characteristic epithelium of the stomach in birds. Plate XXVIII. fig. 2 will assist in rendering this explanation more distinct.

The proventricular compartment is covered by peritoneum, is nearly globose, about the size of a chestnut, and fixed to the right side of the lower end of the œsophagus. On superficial inspection it looks very like an enlarged spleen (that organ being subglobose in birds). Its cavity is very small, being much encroached upon by the great depth of the cylindrical glands which compose its walls. The yellow stomach-epithelium surrounds its orifice and goes no further. There are no indications of additional proventricular glands at the lower termination of the œsophagus, the epithelium in that part being quite smooth and apparently squamous.

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* *Vide* P. Z. S. 1873, p. 636.

† P. Z. S. 1873, p. 636, and 1874, p. 122.

‡ P. Z. S. 1874, p. 116.

§ Vol. iv. p. 158.

This further development in *Plotus* of a special and well-differentiated gland-organ from what in other birds is a zone or a simple circular patch of glands, is very similar to the equally uncommon development of the cardiac gland-organ in the stomach of the Manatee, which is most certainly only a modification of the similarly situated gland-patch in the Dugong.

The stomach is not developed into a gizzard, its walls in no part exceeding one sixth of an inch in thickness. It is divided into two compartments, a cardiac and a pyloric, as is that of the Pelican. The former of these corresponds to the gizzard in most birds, the latter to the imperfectly formed cavity associated with the pyloric valve in the Storks, Gannet, &c. (*vide* Plate XXVIII. fig. 2).

Of the stomach of the Pelican, Hunter tells us* that "it is oblong, much in the direction of the œsophagus, with a little curve, smallest at the lower end: it makes a quick turn and swells again into a round bag; or it may be supposed that from the side near the lower or smaller end is attached a bag whence the duodenum arises." In the Catalogue of the Museum of the Royal College of Surgeons (1852), Prof. Owen† remarks, with reference to a specimen (No. 519) of the stomach of a Pelican (*Pelecanus onocrotalus*), "The œsophagus is continued into the proventriculus or glandular cavity, without any marked constriction; and the latter passes insensibly into the part analogous to a gizzard. This part communicates by a transverse aperture with a small globular cavity, which is lined by a vascular membrane, and communicates with the duodenum by a very small oblique aperture. This superadded cavity renders the analogy between this stomach and that of the Crocodile complete, with the exception of the absence in the latter of distinctly developed gastric glands. These, in the Pelican, are simple elongated follicles, closely compacted together, and extended over a large surface." In *Plotus* the second cavity is similarly situated, intervening between the stomach proper and the duodenum. The dense yellow epithelium of the one, however, extends into the other, right up to the pyloric valve. [It may be that in the specimen described by Prof. Owen the lining had been previously stripped off, which may have led to the term vascular being applied to the mucous membrane of the second stomach.]

Hunter, in his dissection of *Sula* and *Phalacrocorax*, does not mention the existence of a second stomach; and I have not observed or found recorded such an arrangement in either of those genera, or in *Phaëthon*, or in *Fregata*.

In *Plotus* there is still another peculiarity which, as far as I know, is found in only one other bird, namely *Cathartes aura*. In Audubon's 'Ornithological Biography' ‡, Mr. Macgillivray tells us that in the stomach of *C. aura* "there is a pyloric lobe [second compartment] about half an inch in diameter, which is lined with bristly hairs. They are all inserted at right angles to the surface, penetrate to the base of the epithelium, and are of various lengths, some of them not protruding beyond the surface, others upwards of half an inch, of various colours, some black, generally tipped with whitish, others light greyish yellow, all thick at the base, and tapering to a fine point. Being disposed in a regular manner, they might seem to form a part of the organization of the stomach, and not to be, like the hairs found in *Cuculus canorus* and *Coccyzus americanus*, merely extraneous." The pyloric orifice in *Plotus anhinga*, as is seen in Plate XXVIII. fig. 2, is protected by a mat of lengthy hair-like processes, much like cocoa-nut fibre, which nearly half fills the second stomach. This second stomach is globose, and nearly an inch in external diameter. Its dense lining-membrane is raised into short rugæ and tubercles, as is that of the first; and it is evidently a modification of the epithelium which develops these tubercles in the region of the pylorus which gives rise to the above-mentioned mat-sieve. The hairs composing the mat are hispid, slender, and about half an inch long. They arise from a surface a little less than a square inch in area round the pylorus, which is in its centre. They cease at the very margin of the small circular orifice, where the commencement of the delicate mucous membrane of the duodenum can be just seen. My friend, Mr. E. A. Schäfer, Assistant Professor of Physiology at University College, has very kindly examined these hairs microscopically, and tells me that "they are much more like true hairs, both in structure and mode of attachment, than they are like the epithelial projections which are so often met with over the filiform papillæ of the human tongue, which, at first sight, they much resemble. Like hairs, they consist of an outer 'cuticular' part, and an inner 'fibrous' part; and in some places there is also yet another substance running along the middle of the fibrous part, which might be compared to the medulla of a hair. The cuticular part is much thicker in proportion than that of a cutaneous hair, and forms here and there dentate projections at the sides of the filament. The cuticle is continuous with the horny superficial portion of the stratified epithelium which covers this part of the stomach; in neither can the outlines and nuclei of the component cells be distinctly seen, the cells having blended into a nearly homogeneous substance. That portion of the hair which extends below this into the deeper layers of the epithelium, appears not to be covered with a prolongation of the cuticle, but to be formed only of the fibrous part. This last-named seems, like the fibrous or cortical constituent of a cutaneous hair, to be composed of a closely set bundle of much elongated cornefied epithelial cells, slightly larger than those of a cutaneous hair, and with their extremities not fusiform (as in that) but truncated. The number in a cross section varies according to the size of the filament. They may, in many, be seen projecting at the end a little beyond the cuticular part.

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* Essays and Observations, Owen's edition, 1861.

† Vol. i. "Organs of Motion and Digestion," p. 148.

‡ Vol. v. p. 340.

"The roots of the gastric hairs are so closely set as to occupy the greater portion of the mucous membrane, so that the connective tissue of the corium, which occupies the intermediate space, is very small in amount. Between the tissue and the hair-root is seen a layer of columnar epithelium cells, which in some places are of considerable length. They are continuous towards the surface with the deeper cells of the stratified epithelium. They represent the 'root-sheaths' of the cutaneous hair, and seem to have undergone a horny metamorphosis.

"At their extreme ends the roots are entirely different from those of the cutaneous hairs. There is no hair-knob and no papilla; but the root generally breaks up into two, three, or more short rootlets, each of which tapers to a pointed extremity. This, at least, is the appearance in vertical section; but transverse sections show that this branching of the hair-root has, at all events in the first instance, more of a laminated character.

"These rootlets are covered by a layer of cubical epithelium cells, which are continuous with the columnar cells surrounding the hair-root. The latter, as before remarked, is formed merely by the fibrous substance or cortical portion of the hair; and the fibres which compose this would therefore seem to be in some way produced by these cells.

"Some few hairs seem to end by a single tapering rootlet, but most of them spread out and branch in the way described."

This peculiar hairy mat must act as an excellent sieve to prevent the entrance of solid particles, fish-bones, &c. into the narrow intestines.

The small intestine is 55 inches long in the female, and 40 inches in the male; and it is not capacious. The duodenal loop measures 5 inches in each limb. The left lobe of the bilobed liver is about half the size of the right; and a gall-bladder of considerable size is present. The large intestine is 6 inches long in the female, and 3 inches in the male. There is only a single cæcum, exactly like that in the Ardeidæ, in my specimens. This conformation of cæcum is found in no other Steganopod bird, there being two cæca in all the other genera. These, in *Pelecanus*, are a little over an inch in length, in *Sula* slightly shorter, whilst in *Phalacrocorax*, *Fregata*, and *Phaëthon* they are simple knob-like bodies, nearly globose in form. The rudiment of the vitelline duct is persistent.

In the distance of its diminutive cæcum from the cloaca (in other words, in the length of the large intestine) *Plotus* differs slightly from its allies. In *Pelecanus* the large intestine is under 2 inches in length; and it is much the same in *Sula*. In *Phaëthon* it does not exceed a quarter of an inch in length. It, however, differs considerably in my two specimens, being in both longer than the same in Audubon's specimen.

In the urino-genital system of *Plotus anhinga*, in both sexes, the ducts open in the normal manner into the cloaca, just above its lower orifice. This orifice, however, is not on the surface, but is into a cavity, behind the cloaca, which opens externally quite close to the place where the two communicate. Except for this nearly marginal orifice the second cavity is a cæcal sac, oval in shape, and about

1½ inch high, covered at its blind end with the crypts of shallow glands, which also run down its sides. That it is a modification of the *bursa Fabricii* cannot be doubted.

EXPLANATION OF THE PLATES.

PLATE XXVI.

Fig. 1. View of left side of neck of *Plotus anhinga*, dissected. *l.c.a.* longus colli anterior muscle; *l.c.p.* longus colli posterior muscle. The fibrous representative of Donitz's bridge is seen attached to the ninth cervical vertebra.

2. View of part of the posterior region of the neck of *Plotus anhinga*. The Roman figures refer to the cervical vertebræ counted from the head. Donitz's bridge is seen attached to the ninth; and at *a* is also seen a fibrous band, which is of similar function, attached to the eleventh. At *b* is seen the fasciculus of the tendon of the posterior neck-muscle which traverses the fibrous loop, which latter has been removed on the left side.

PLATE XXVII.

View of the anterior thoracic region of *Plotus anhinga*, dissected to show the superficial (*p.* 1, 1) and deep layer (*p.* 1, 2) of the pectoralis major muscle on the right side, as well as the pectoralis minor (*p.* 2) on the left. The insertion of the deeper layer of the pectoralis major is seen to be surrounded by the much more considerable mass of the similar portion of the superficial stronger layer. The triceps (*t*) and the biceps (*b*) of the cubitus are seen on the right side, as is the patagial slip (*b. s*) of the latter. The sternum (*st.*) is superficially bound to the lower end of the coracoid bone by the anterior sterno-coracoid ligament (*ant. st. cor. lig*), which is particularly powerful in the Steganopods and Storks.

PLATE XXVIII.

Fig. 1. View of top of head of *Plotus anhinga*, showing the occipital style (*a*) and the temporal muscle (*t*) arising from it on one side.

2. Stomach of *Plotus anhinga*, inside view.

3. Anterior view of the lower end of the trachea in *Plotus anhinga*.

4. The same in *Sula bassana*.

5 & 6. Top and side view of the patella in *Phalacrocorax carbo*, showing the canal for the ambiens muscle. *N.B.* The side view (fig. 6) is accidentally drawn with the base uppermost.

7. Front of patella in *Plotus anhinga* deeply grooved by ambiens muscle.

2. Remarks on a Hybrid between the Black Grouse and the Hazel Grouse. By H. E. Dresser, F.Z.S.

Amongst the Gallinaceous birds, and especially amongst the Ducks, we not unfrequently find wild hybrids; and not a few of these hybrids have during the last year or two been exhibited at the meetings of this Society—but none, I may almost venture to say, so interesting as the bird I have now the pleasure to exhibit before the meeting; for there can be no doubt that it is a wild cross between the Black Grouse (*Tetrao tetrix*) and the Hazel Grouse (*Bonasa betulina*), a cross that has, so far as I can ascertain, never yet been recorded. The *Rackelvogel* of the Swedes, the hybrid between the Capercailly and the Black Grouse, is by no means uncommon, especially in places where the males of the Capercailly have been shot off; and I have seen several interesting hybrids between the Black Grouse and the Willow Grouse. Mr. Collett names an instance of a male Willow Grouse having been seen to pair with a barndoor Fowl; and I have heard of the Black Grouse crossing with the Red Grouse; but I have never seen a specimen of a hybrid between these two; and I may add that I can find no record in the works of the Scandinavian authors of a hybrid between the Hazel Grouse and the Black Grouse having hitherto been met with. The specimen exhibited belongs to John Flower, Esq., F.Z.S., who has intrusted it to me for examination and exhibition, and who gives me the following particulars respecting it:—

"I bought this bird of W. Smithers, poulterer, near the Cannon-Street Railway Station, on March 16, 1876. It had passed through several hands before it came to Mr. Smithers; and all that I have as yet been able to learn of its past history is that it came from Norway. Some one who has had the bird seems to have been aware that it was something out of the common, as I found a piece of cotton wool had been placed in the œsophagus, no doubt to prevent the feathers being soiled by the escape of matter through the mouth; and judging from its appearance, the wool had been there some considerable time.

"The weight of the bird, which was in very fair condition, was a trifle over 1 lb. 9 oz. The weight of a grey hen, which I weighed for the purpose of comparison, I found to be 1 lb. $10\frac{3}{4}$ oz.

"On dissection the hybrid proved to be a male. The intestines and cæca were as nearly as possible exactly like those of the grey hen, except that the intestine of the hybrid (measured from the gizzard to the lower end of the cæca) was 3 inches shorter than in the grey hen, the length between these points being, for the grey hen 54 inches, for the hybrid 51 inches. The length of the cæca in both was 24 inches.

"The crop was empty; but the gizzard contained a quantity of small stones, most of them of white quartz, and a quantity of twigs and vegetable matter, including one bud of a birch catkin. I turned the contents of the gizzard out into a small basin of warm water; and these, when stirred, emitted rather a sweet aromatic smell, which must have arisen from the vegetable matter which the bird had eaten.

"Thinking something might be learnt from the colour of the pectoral muscles when cooked, I had the muscles of the hybrid and of the grey hen baked. Those of the grey hen then presented the usual contrast characteristic of the Black Grouse; but the muscles of the hybrid were nearly white, the lower muscle being slightly brighter in colour than the upper one. The flesh of the hybrid was much inferior in flavour to that of the black Grouse, being rather dry and tasteless, much like the flesh of a red-legged Partridge. I have preserved the breast-bone and pelvis; and they accompany this memorandum."

I may remark that, so far as my own experience goes, and from what I have ascertained from the various Swedish and Russian sportsmen who have had ample opportunities of studying the habits of the Hazel Grouse, it is always monogamous, and that when paired the pair remain strictly faithful to each other. Therefore I have never heard of a Hazel cock having been seen at a "lek" of the Black Grouse, though the male Willow Grouse has been known to attend there, and to take ample advantage of his opportunities. I can only surmise that the present hybrid has been the result of a Hazel cock which had failed in finding a mate, having paired with some Grey Hen met with during his solitary wanderings.

8. On the Genus *Dasyprocta*; with Description of a New Species. By Edward R. Alston, F.L.S., F.G.S., F.Z.S.

[Received March 11, 1876.]

(Plate XXIX.)

My attention has been lately turned to the Mammals of Central America; and I have hence been led to review all the known species of the genus *Dasyprocta*, concerning the characters and distribution of which a good deal of confusion has existed. Through the kindness of Mr. Sclater and Dr. Günther I have been enabled to compare the skins of a number of Agoutis which have died from time to time in the Society's Gardens with the specimens in the British Museum, and believe that I am now able to arrange the various forms with some approach to general correctness.

The range of the genus *Dasyprocta* extends throughout a considerable part of the Neotropical Region, from the Antilles and Mexico in the north to Brazil and Paraguay in the south. Within these limits there exist a number of well-marked but nearly allied geographical races, of which eight or nine appear to deserve specific distinction. As might be expected in such closely related forms, I have been unable to find any constant cranial distinctions, and have been compelled to depend on outward characters, of which I have found the coloration of the long hairs of the rump to be the most trustworthy. Owing to the confusion which has existed as to some of these species, and to the carelessness of collectors and museum-curators as to locality, it is very difficult to make out the exact distribution of the various races of Agouti; but I have endeavoured to note what little information we possess.

The following, then, is the principal synonymy, with brief diagnoses and habitats, of the various Agoutis, beginning with a well-marked species, which appears never to have been described, and which I propose to call:—

1. Dasyprocta isthmica, sp. n.

Fur ringed with black and yellow; rump black, more or less washed with orange or yellow, the long hairs being black at the base, scarcely annulated except close to the tips, which are broadly margined with the light colour; feet dusky. Length about 22 in., hind foot 4·25 in.

Hab. Central America.

This Agouti is at once distinguished from all the others which have black and yellow annulated fur, by the long hairs of the rump being black with broad pale tips. Seven or eight individuals of both sexes agree in all essential characters, but differ slightly in the colour of the tips of the long hairs, and consequently in the general colour of the rump. The exact distribution of the species is still uncertain. Several living examples have been received from Colon by the Society, which have hitherto been referred to *D. punctata**; and it appears probable that the Agouti of Costa Rica which Dr. von Frantzius calls *D. cristata*† will prove to be the same.

2. D. CRISTATA.

Cavia cristata (Geoffroy), Desmarest, Nouv. Dict. d'Hist. Nat. i. p. 215 (1816, descr. orig.).

Dasyprocta cristata, Desmarest, Mamm. p. 358; Waterhouse, Mamm. ii. p. 383; Wagner, Suppl. Schreb. Säugeth. iv. p. 41.

Dasyprocta antillensis, Sclater, P. Z. S. 1874, p. 666, pl. lxxxii (descr. orig.).

Fur very dark, ringed with black and reddish or brownish yellow, nuchal tuft and rump black, the long hairs either dusky or obscurely ringed at the base. Length about 18 in.; hind foot 3·75 in.

Hab. West Indies.

The West-Indian Agouti for which Mr. Sclater proposed the provisional name of *D. antillensis*, is identical with the specimens which Mr. Waterhouse identified with Desmarest's *D. cristata*, and seems to agree perfectly with the original descriptions. The phrase *pelage noirâtre, piqueté de roux*, is particularly characteristic; and I am convinced that Mr. Waterhouse was correct, although the figure in F. Cuvier and Geoffroy's 'Mammifères' (iii. livr. 52) gives the idea of a lighter animal. The species was founded on a pair of Agoutis in the Jardin des Plantes, which were said to have been received from Surinam. There can be little doubt, however, that this was an error, and that the species is a strictly insular race. The Society has received living specimens from St. Vincent and St. Lucia; and there are skins from St. Thomas in the British Museum. In one example from the first-named island, the hairs of the rump are obscurely ringed at the base, and the nuchal crest is but little developed.

3. D. VARIEGATA.

Dasyprocta variegata, Von Tschudi, Faun. Peru. p. 190, pl. xvi. (1844, descr. orig.).

Fur dusky at base, black, ringed with pale yellow only near the tip, the long hairs of the nape and rump entirely black, or with a narrow pure white ring near the tip. Length about 22 inches, hind foot 4 inches.

Hab. Peru, New Granada, Panama?

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* *Cf.* Sclater, P. Z. S. 1874, p. 666.

† *Cf.* Wiegm. Arch. 1869, p. 274.

Mr. Waterhouse united the Peruvian Agouti with *D. cristata*; but it is a well-marked species, easily distinguishable by the fur being annulated only near the tip. According to Von Tschudi it inhabits the forests and "ceja" regions of Eastern Peru, to an altitude of 6000 feet above the sea. The Society has received living specimens from Colon, the exact locality of which is uncertain; and Mr. E. Gerrard, Jun., has kindly lent me two fine examples collected by Mr. Salmon at Medellin, near Antioquia, New Granada. It is probable that the Agouti obtained by Mr. Fraser, at Palhatanga, Equador, which Mr. Tomes referred to *D. caudata* (*D. azaræ*)* was really of this species.

4. D. FULIGINOSA.

Dasyprocta fuliginosa, Wagler, Isis, 1832, p. 1220 (descr. orig.); Waterhouse, Mamm. ii. p. 385.

Dasyprocta nigricans (Natterer), Wagner, Wiegm. Arch. 1842, p. 362 (descr. orig.); Wagner, Suppl. Schreb. Säugeth. iv. p. 46.

Dasyprocta nigra, Gray, Ann. Nat. Hist. x. p. 264 (1842, descr. orig.), Voy. 'Sulphur,' p. 36, pl. xvi.

Fur ringed with brownish or sooty black and pure white; rump hoary, the very long and soft hairs being broadly tipped and often ringed at the base with white. Length about 23 inches; hind foot 4·75 inches.

Hab. Amazonia; Peru; Ecuador†.

Wagner and Waterhouse have shown that the above are merely synonyms of this large dark species. Wagler described it from specimens collected on the Brazilian Amazons; and Natterer obtained it at Borba and on the Rio Nigro. Mr. Sclater has a skin collected by Mr. E. Bartlett, at Chamicuros, on the Peruvian Amazons; and a specimen obtained in Ecuador, by Mr. Fraser, was referred to this species by Mr. Tomes.

5. D. MEXICANA.

Dasyprocta mexicana, De Saussure, Rev. et Mag. de Zool. (2e sér.), xii. p. 53 (1860, descr. orig.).

Fur ringed with black and pure white, the rump black, the long hairs being black throughout their length, throat and belly almost white. Average length 17 inches; hind foot 3·50 inches.

Hab. Mexico.

As remarked by its first describer, this species most resembles *D. fuliginosa*. It differs, however, in its much smaller size, its darker coloration, and in the less elongated hairs of the rump being black throughout from the base to the tip. It is a native of the "hot zone" of Mexico; and a specimen is now living in the Society's Gardens, presented by Mr. Marckmann de Lichtabel, in February 1874‡.

6. D. AZARÆ. (Plate XXIX.)

Dasyprocta azaræ, Lichtenstein, Doubl. Zool. Mus. Berl. p. 3

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* P. Z. S. 1860, p. 216.

† *Cf.* P. Z. S. 1860, p. 216.

‡ *Cf.* P. Z. S. 1874, p. 683.

(1823, descr. orig.); Wagner, Suppl. Schreb. Säugeth. iv. p. 38; Waterhouse, Mamm. ii. p. 387.

Dasyprocta caudata, Lund, K. Dansk. Vidensk. viii. p. 297 (1841, descr. orig.).

Fur ringed with black and yellow, nearly uniform throughout, slightly darker on the back and often hoary on the rump; the long hairs ringed to the base; throat and breast pure yellow. Length 20 inches; hind foot 3·30.

Hab. S. Brazil, Paraguay, Bolivia.

This is the most southern species of Agouti, replacing the more northern *N. aguti* in the province of St. Paulo, Brazil, where Natterer found it in great numbers. If Wagner is right, however, in uniting Lund's *D. caudata* with the present species, its range extends a little further north, into the Province of Minas Geraes. Southwards it is found, according to Dr. Burmeister, throughout southern Brazil and Paraguay, but does not extend beyond the Rio de la Plata*. In Bolivia, Mr. Waterhouse says that it was found by Mr. Bridges, near Santa Cruz de la Sierra, where it is called *Hoche colorado* by the inhabitants.

As I hope to have another opportunity of figuring the Central-American Agoutis, I have chosen this species, of which I am not acquainted with any good representation, as the subject of the accompanying Plate (Plate XXIX.).

7. D. PUNCTATA.

Dasyprocta punctata, Gray, Ann. Nat. Hist. x. p. 264 (1842, descr. orig.), Voy. 'Sulphur,' p. 36, pl. xv.

Fur ringed with black, and either bright rufous or yellow, uniform throughout, hairs of rump scarcely elongated, ringed to the base; breast and lower parts also annulated, except a pale median line on the abdomen. Length about 22 inches; hind foot 4 inches.

Hab. Guatemala, Costa Rica.

Skins collected by Mr. Salvin in Guatemala differ much in ruddiness, from a bright chestnut to a pale yellow. The latter agree exactly with the types of Gray's *D. punctata* (from "Tropical America"). They so much resemble *D. azaræ* that one might be inclined to follow Wagner and Waterhouse in uniting them, were it not for the vast difference in their geographical position†. Even the pale examples of *D. punctata* may be always distinguished from the Brazilian form by the larger size, the still more uniform coloration, and the annulation of the fur on the chest; and I have never seen a specimen of *D. azaræ* which showed a trace of the rich ruddy tints which seem to be normal in the Guatemalan form. The Society has also received this species from Costa Rica.

8. D. AGUTI.

Mus aguti, Linnæus, Syst. Nat. i. p. 80 (1766, descr. orig.).

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* Thiere Brasil. p. 233.

† *Cf.* Mr. Salvin's remarks on some analogous facts in the distribution of birds (Ibis, 1872, pp. 147–152).

Dasyprocta aguti, Desmarest, Mamm. p. 358; F. Cuvier et Geoffroy, Mamm. iii. 3^{me} liv.; Waterhouse, Mamm. ii. p. 376; Wagner, Suppl. Schreb. Säugeth. iv. p. 42.

Fur ringed with black and yellow; rump bright yellow or orange, the long hairs pale yellow at their base, and only obscurely ringed near the tip. Length about 20 inches.

Guiana, N. Brazil, E. Peru.

The range of the Yellow-rumped Agouti is particularly difficult to make out, as its specific name has been applied to almost every member of the genus. It extends, however, from British Guiana, where Schomburgk* says it is extremely common, through North Brazil, where Natterer collected specimens near the junction of the Madeira and Amazons, to Eastern Peru. In the latter country Von Tschudi says that it inhabits the plains, and does not go up into the mountains like *D. fuliginosa*.

9. D. PRYMNOLOPHA.

Dasyprocta prymnolopha, Wagler, Isis, 1831, p. 619 (descr. orig.); Wagner, Suppl. Schreb. Säugeth. iv. p. 46; Waterhouse, Mamm. ii. p. 380.

Fur ringed with black and yellow; nuchal crest and a longitudinal band on the rump black, sides of the rump rich golden orange or rufous; the long black hair uniform in colour, or light yellow at the base. Length about 20 inches; hind foot 3·75.

Hab. Guiana.

Of the distribution of this most beautiful species I have been unable to learn any thing beyond the fact of its being a native of Guiana. It is probably a more northern race than the last, and may extend into Venezuela. Many examples are now living in the Society's Gardens.

10. D. ACOUCHY.

Cavia acouchy, Erxleben, Syst. Reg. An. p. 354 (1777, descr. orig.).

Dasyprocta acouchy, Desmarest, Mamm. ii. p. 358; Wagner, Suppl. Schreb. Säugeth. iv. p. 48; Waterhouse, Mamm. ii. p. 391.

Fur ringed with dark brown and rufous, upper parts darker, lower parts and a spot behind each ear bright rufous or yellow. Tail produced, slender, slightly haired. Length about 14 inches, tail 2 inches, hind foot 3 inches.

Hab. Guiana, N. Brazil.

This little species, easily distinguished from all the rest by its having a complete tail, instead of merely a tuberculous rudiment, is abundant in Guiana and North Brazil; but I have been unable to find any proof of the often repeated assertion that it is also met with in some of the West-Indian Islands. Probably it has been confused with *D. cristata*.

Of the remaining described species, *D. croconota*, Wagler (Isis

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* Reisen in Brit. Guiana, iii. p. 779.

1831, p. 618), appears to have been founded on an individual variation of *D. aguti* with white incisors; *D. albida*, Gray (Ann. Nat. Hist. x. p. 264) is probably, as Mr. Sclater has suggested*, an accidental variety of the Antillean Agouti which I have here referred to *D. cristata*; and, finally, Mr. Waterhouse was no doubt correct in regarding "*D. leptura*, Natterer" (Wagner, Schreb. Säug. iv. p. 49) and *D. exilis*, Wagler (Isis, 1831, p. 619), as being merely synonyms of *D. acouchi*.

4. On new Species of Bolivian Birds. By P. L. Sclater, M.A., Ph. D., F.R.S., and Osbert Salvin, M.A., F.R.S.

[Received April 3, 1876.]

(Plates XXX.–XXXIII.)

The following new species of birds are founded on specimens contained in a collection recently formed in Bolivia by Mr. C. Buckley. Nearly the whole of this collection was made in the province of Yungas, in a forest-clad spur of the Andes which extends in a north-easterly direction between the Rio de la Paz and the Rio Coroico, affluents of the Rio Beni and then of the great tributary of the Amazon the Rio Madeira. Mr. Buckley's head quarters in this district was a place called Tilotilo, a mere group of Ranchos not indicated on any map. The country he explored included a great range of elevation, extending from about 3000 feet to 12000 feet above the sea-level, and consequently considerable variation of climate and vegetation, the rich forests so characteristic of the eastern slopes of the Andes forming the chief feature. The collection, which contains between 400 and 500 skins of about 194 species, has passed into the hands of Messrs. Salvin and Godman. The following are the species in it which we consider to be undescribed.

1. Catharus mentalis, sp. nov.

Supra saturate fumoso-brunneus unicolor, alis caudaque paulo obscurioribus: subtus schistaceus medialiter dilutior, ventre medio fere albo; mento et gula cum genis brunneo indutis: rostro aurantiaco; pedibus pallide corylinis: long. tota 6·5, *alæ* 3·3, *caudæ* 3·2, *tarsi* 1·3, *rostri* 0·95.

Hab. "Suape" prope "Tilotilo" prov. Yungas, Bolivia.

Obs. Similis *C. fuscatro*, sed mento brunnescente et colore corporis superi fuscescentiore distinguendus.

2. Basileuterus euophrys, sp. nov.

Supra olivaceo-viridis unicolor: superciliis latis et corpore subtus flavis: loris, pileo medio et regione oculari nigris: rostro nigro: pedibus pallidis: long. tota 5·5, *alæ* 2·7, *caudæ* 2·6, *tarsi* 0·95,

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* P. Z. S. 1874, p. 666.

rostri a rictu 0·67. Fem. *mari similis, sed pileo et loris vix nigricantibus.*

Hab. Tilotilo, prov. Yungas, Bolivia.

Obs. B. nigri-cristato affinis, sed superciliis latis et elongatis diversus.

3. Malacothraupis dentata, sp. et gen. nov. (Plate XXXI.)

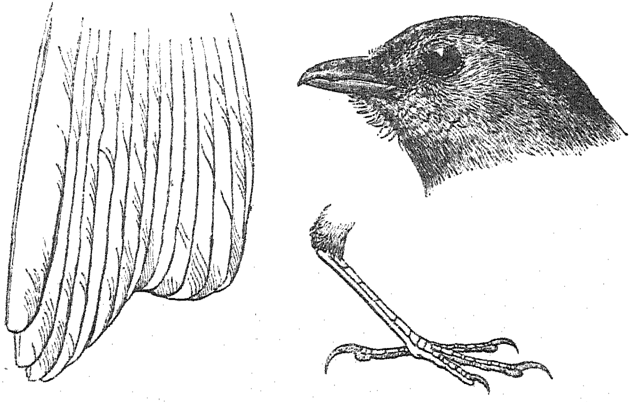
Malacothraupis, *gen. nov. ex familia Tanagridarum, generi* Lanioni *affine, sed rostro crassiore et minus elongato et alis brevioribus distinguendum: rostrum medialiter dentatum et ad apicem uncinatum: setæ rictales vix ullæ: alæ breviusculæ, rotundatæ, remigibus* iii^to^ iv^to^ *et* v^to^ *fere æqualibus et longissimis, primo quam septimus paulo breviore: pedes modici: cauda paulum elongata.*

Sp. unica M. dentata.

Supra cinerea, pileo paulo obscuriore superciliis angustis albis: alis et cauda nigricantibus cinereo limbatis: subtus clare castanea, mento et abdomine medio albis: crisso cinereo adumbrato: rostro superiore nigricante, inferiore fusco, pedibus obscure plumbeis.

Hab. Tilotilo, prov. Yungas, Bolivia.

Fig. 1.



Head, wing, and foot of *M. dentata.*

4. Calliste punctulata, sp. nov.

Supra læte viridis, plumarum centris nigris quasi punctata: alis caudaque nigris viridi limbatis: subtus alba, nigro guttata, ventre medio pure albo: hypochondriis et crisso aureo indutis: rostro et pedibus nigris: long. tota 4·5, *alæ* 2·5, *caudæ* 2·0.

Hab. Tilotilo, prov. Yungas, Bolivia.

Obs. Species, sicut in *C. guttata,* subtus distincte maculata, sed ab hac colore capitis nitore aureo omnino carente diversa, et ideo magis ad *C. punctatam* appropinquans.

5. CALLISTE FULVICERVIX, sp. nov. (Plate XXX. fig. 1.)

Cærulea: alis caudaque nigris cæruleo limbatis: ventre medio crissoque albis ochraceo tinctis: loris nigris: fascia trans nucham angusta stramineo-fulva: subalaribus albis: rostro nigro; pedibus fuscis: long. tota 4·3, *alæ* 2·9, *caudæ* 1·9.

Hab. Tilotilo, prov. Yungas, Bolivia.

Obs. Species *C. ruficervici* affinis, sed colore corporis puriore cæruleo, pileo quoque et cervice postica cæruleis pectori concoloribus, neque nigris distinguenda.

6. CALLISTE ARGYROFENGES, sp. nov. (Plate XXX. fig. 2.)

Supra nitide stramineo-flava, pileo alis et cauda sericeo-nigris: subtus abdomine nigro, lateribus stramineo-flavis, et gula argenteo-viridi insignis: subalaribus nigris: rostro et pedibus nigris: long. tota 4·5, *alæ* 2·8, *caudæ* 1·9.

Hab. Tilotilo, prov. Yungas, Bolivia.

Obs. Proxima *C. argenteæ*, sed alis omnino nigris, gula viridescentiore et dorso flavescentiore sane diversa.

7. CHLOROSPINGUS CALOPHRYS, sp. nov.

Supra olivaceo-viridis, pileo cum nucha et capitis lateribus nigris: fronte et superciliis latis et elongatis aurantiacis: subtus flavus, gutture aurantiaco, lateribus in olivaceum trahentibus: rostro plumbeo, tomiis pallidis: pedibus pallide fuscis: long. tota 5·5, *alæ* 2·65.

Hab. Tilotilo, prov. Yungas, Bolivia.

Obs. Proximus *C. auriculari* ex Peruvia, sed ab hoc, item ab affini *C. atripileo* ex Columbia, superciliis aurantiacis gula concoloribus diversus.

8. CYANOCORAX NIGRICEPS, sp. nov.

Cineraceo-violaceus, capite undique cum gula et cervice antica nigris: remigibus intus cineraceis: cauda supra cærulea, subtus nigricante: rostro et pedibus nigris: long. tota 1·30, *alæ* 7·5, *caudæ* 6·5.

Hab. Tilotilo, prov. Yungas, Bolivia.

Obs. Similis *C. cyanomelani* ex Paraguaya, sed capite nigro et rostro crassiore satis diversus.

9. OCHTHODIÆTA FUSCORUFUS, sp. nov.

Supra fumoso-brunneus unicolor; alis caudaque nigricantibus, secundariorum marginibus externis et tectricum minorum et majorum fascia apicali necnon rectricis extimæ margine exteriore clare rufis, remigum omnium pogoniis internis nisi apud apices et rectricum omnium marginibus internis cum corpore toto subtus ferrugineo-rufis: gula albicante, fusco obsolete striolata: rostro et pedibus nigris: long. tota 7·0, *alæ* 4·1, *caudæ* 3·2, *tarsi* 0·9.

Hab. Tilotilo, prov. Yungas, Bolivia, et Peruvia int.

Obs. Species *Ochthodiætæ* et *Ochthœcæ* generibus quasi intermedia, cum illo melius congruere videtur: habitus fere sicut *O. fumigati*, sed rostro breviore, et quoad colores corpore subtus ferrugineo primo visu distinguenda.

Besides the Bolivian example, we have a specimen of this same species obtained by Mr. Whitely, at Paucartambo, in Peru, in January 1874.

10. OCHTHŒCA PULCHELLA, sp. nov.

Supra cinerea, dorso postico rufescente: loris et superciliis angustis citrino-flavis, fronte pileo concolori: alis et cauda fuscis, secundariorum marginibus externis et tectricum majorum et minorum apicibus clare rufis: subtus dilutius cinerea, ventre medio albicantiore, hypochondriis rufescentibus: rostro fusco, subtus ad basin albicante: pedibus nigris: long. tota 4·5, *alæ* 2·4, *caudae* 2·0.

Hab. Tilotilo, prov. Yungas, Bolivia.

Obs. Species forma et ptilosi *O. citrinifrontis*, ex Æquatoria, sed fronte non flava et alis rufo bifasciatis distinguenda.

11. ANÆRETES FLAVIROSTRIS, sp. nov.

Supra cineraceo-olivaceus, fronte et lateribus capitis nigro striolatis, pilei plumis ad basin albis, crista tenui elongata nigra terminatis: alis nigris, secundariorum et tectricum alarium marginibus latis distincte albis: cauda nigra, rectricis utrinque extimæ pogonio externo toto et ceterarum, nisi in mediis, apicibus angustis albis: subtus pallide citrino-flavicans, gula et pectore toto albo et nigro confertim flammulato: rostro ad basin aurantiaco, ad apicem nigricante: pedibus nigris: long. tota 4·0, *alæ* 2·1, *caudæ* 2·2.

Hab. Tilotilo, prov. Yungas, Bolivia.

Obs. Species *A. parulo* proxima, sed flammulis pectoris latioribus, tectricum fasciis albis distinctis et rostro ad basin aurantiaco diversa.

Sclater's collection contains a worn specimen of this species collected in Bolivia by Bridges, which has been hitherto referred to *A. parulus.*

12. LATHRIA UROPYGIALIS, sp. nov. (Plate XXXII.)

Supra cinerea unicolor, alis caudaque obscurioribus; uropygio late castaneo: subtus dilutior, hypochondriis et ventre imo cum crisso castaneo-rufis: alarum remigibus primariis externis in mare valde acuminatis et extrorsum versis, in femina paulum acuminatis: rostro corneo, pedibus nigris: long. tota 10·5, *alæ* 5·5, *caudæ* 5·6.

Hab. Tilotilo, ad alt. 8000 ped., Bolivia.

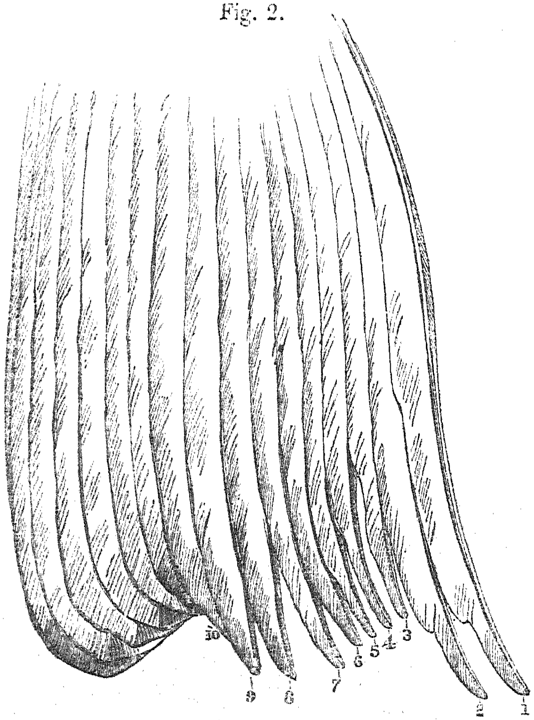
Obs. Species remigum forma abnormali insignissima, crassitie et habitu generali *L. fuscocinereæ* prædita.

The structure of the wing of this species is of so remarkable a character that it deserves a more lengthened notice.

As will be seen by the figure, the inner web of the first primary of the male of *L. uropygialis* begins to be slightly attenuated at

about two thirds of its distance from the base: at about half an inch from the extremity it is still further reduced by more than one half, and at the same time curved gently outwards. The second primary

Fig. 2.



Primaries of *Lathria uropygialis*, from inside.

is very similar to the first, and nearly of the same length. The third, fourth, and fifth are still more abnormally attenuated, and ·6 inch shorter than the first two. They are nearly of equal length; but the third is slightly shorter than the fourth, and this than the fifth. The sixth primary is rather more normal in appearance, and a little longer than the fifth. The seventh, eighth and ninth are nearly equal in length and, next to the first and second, the longest in the wing. They are pointed at their extremities and but slightly turned outwards. The tenth and last primary is normal throughout: except at the end, which is pointed; its outward curve is very slight. Besides this abnormality, the inner web of each primary is slightly turned upwards along its margin, so as to clasp the shaft of the next succeeding primary when the wing is expanded. The barbules, also, of the outer webs of the primaries from the fourth to the seventh inclusive, terminate in fine filaments.

This structure is the same in two specimens of this singular bird, which are, no doubt, males. In another, which we take to be a female, the structure is much more normal. The primaries gradually increase in length from the first to the fifth, sixth, and seventh, which are nearly equal and longest. They have but a slight outward curvature at the extremities; and the inner webs are comparatively but slightly reduced.

In *L. fusco-cinerea*, which in general size and structure comes nearest to the present bird, the primaries are normal throughout, and show none of these peculiarities.

This singular wing-structure is worthy of at least a subgeneric distinction; and we suggest the term *Chirocylla** as indicative of it.

13. GRALLARIA ERYTHROTIS, sp. nov.

Supra obscure olivacea, cinereo tincta: subtus valde dilutior et rufescente lavata, ventre medio pæne albo: regione auriculari vivide rufa, fronte et superciliis hoc colore tinctis: rostro nigro, ad apicem albicante, pedibus clare corylinis: long. tota 6·0, *alæ* 3·5, *caudæ* 2·0, *tarsi* 2·0.

Hab. Tilotilo, prov. Yungas, Bolivia.

Obs. Species forma et statura omnino *G. monticolæ*, sed regione auriculari rufa distinguenda.

14. THAMNOPHILUS SUBFASCIATUS, sp. nov. (Plate XXXIII.)

Supra cinereus olivaceo tinctus, pileo et alis extus rufis: subtus cinereus, pectore toto et ventre medio albo et nigro confertim transfasciatis: cauda nigra, rectricum pogoniis internis albo transfasciatis: subalaribus et remigum marginibus internis ochraceis: rostro corneo, pedibus nigris: long. tota 5·5, *alæ* 2·7, *caudæ* 2·6.

Fem. *Rufescenti-cinerea, pileo, alis extus et cauda rufis: subtus ochraceo-rufescens unicolor.*

Hab. Tilotilo, prov. Yungas, Bolivia.

Obs. Sp. *Th. argentino* maxime affinis, sed fasciis pectoris nigris latioribus et crebrioribus, rostro fortiore et colore feminæ diversa.

15. ASTURINA SATURATA, sp. nov.

Supra fusca, dorsi plumis et scapularibus intus pallidiore fusco vel ferrugineo transfasciatis: capite toto fusco-nigro, gula concolori, albido vix striato: subtus præcipue in pectore saturate rufa, abdomine toto et tibiis pallido ferrugineo transfasciatis: crisso fulvo, fere unicolori: remigibus primariis rufis, nigro transfasciatis, intus in pogonio interiore fulvescenti-albis, apicibus fusco-nigris: cauda rufescenti-fusca, subtus dilutiore nigro trivittata; rectrice una utrinque extima basin versus fasciis duabus angustis alteris notata: rostro nigro, cera et pedibus flavis: long. tota 15·0, *alæ* 10·0, *caudæ* 7·0, *rostri a rictu* 1·25, *tarsi* 2·55.

Hab. Apollo et Tilotilo, Bolivia.

Obs. A. nattereri forsan proxima, sed capite nigrescentiore et fasciis caudæ pallidis distincte ferrugineis diversa.

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* Χεὶρ, *manus*, et κυλλὸς, *curvus*.

This Bolivian race of *Asturina* seems to be separable from the form already recognized, by its combination of the characters of several of its allies. The tail is like that of the Central-American *A. ruficauda*, from which, however, it differs in the dark head and rufous chest. The underparts resemble those of *A. nattereri*; but the head is darker, and the tail is differently coloured. *A. pucherani* differs from the present bird in the lighter, almost creamy, colour of the underparts and primaries.

A recent examination in the Paris Museum of the specimens referred to as *Astur magnirostris* by D'Orbigny (Syn. Av. p. 5; and Voy. p. 91) proves them to belong to *Asturina pucherani* as defined in our synopsis of the genus *Asturina* (P. Z. S. 1869, p. 133, and Exot. Orn. p. 177, t. 89); though from D'Orbigny's remarks upon them we were previously in some doubt on this point.

5. A Revision of the Neotropical Anatidæ. By P. L. Sclater, M.A., Ph.D., F.R.S., and Osbert Salvin, M.A., F.R.S.

[Received April 4, 1876.]

(Plate XXXIV.)

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III. Synopsis of the species 360
IV. Table of their geographical distribution and remarks thereon... 409

I. INTRODUCTION.

The greater part of this paper was written before the issue of the 'Nomenclator Avium Neotropicalium' in 1873; and the systematic arrangement of the genera and species of Anatidæ adopted in the 'Nomenclator' was taken from the MS., which was laid aside unfinished in consequence of the pressure of other matters. It has now been thought desirable to complete it for publication, in order to show the ground upon which certain species were included in the list, and in order to give a more complete account of the geographical distribution of the South-American Anatidæ than has yet appeared. Certain necessary changes in the nomenclature have been introduced.

As only a small portion of this widely distributed family is treated of here, no attempt has been made to propound any new classifications, but that in ordinary use has been followed.

It has not been thought necessary to give descriptions of the species contained in Baird's 'Birds of North America.'

II. PRELIMINARY REMARKS ON THE NEOTROPICAL ANATIDÆ.

The Anatidæ of the southern portion of the South-American continent differ greatly, both as to genera and species, from the members of the same group of birds found on the northern confines of the Neotropical fauna. The former are most of them peculiar to the districts in which they are found, whilst the latter, with few exceptions, consist of winter emigrants from the northern continent. In the intermediate country, comprising by far the larger portion of South America, few members of this family are met with. In speaking of the Anatidæ of the Neotropical Region, therefore, our subject very naturally divides itself into two portions, each of which requires somewhat different treatment, owing to the amount of attention they have received from naturalists. We propose, then, to give a more complete account of those species which belong strictly to the southern continent, including the Antilles and Central America with Mexico. The species which belong to the northern continent and which only come during winter within the limits of the South-American avifauna, on the other hand, we shall handle more briefly, confining our notes and references to such as bear upon their occurrence in their winter quarters.

The geographical distribution of the South-American Anatidæ requires special consideration, inasmuch as the members of this family found in the Neotropical region, except in a few cases, do not conform in their range to the limits assigned to that region, but to a great extent rally round the more temperate portions of the continent. The characteristic species are in no case met with near the northern boundaries of the Neotropical region.

The equatorial genera *Dendrocygna* and *Cairina*, however, reach Southern Mexico; and the former is represented throughout the Antilles. They alone are distributed according to the prevailing law affecting Neotropical birds. Intertropical countries in general are not rich in Anatidæ; and America is no exception to the rule. The Tree-ducks (*Dendrocygna*) form the chief exception. They alone abound in Tropical America, the high Andes (tropical only in position) being, of course, left out of consideration. The cause of this scarcity is not very apparent at first sight. The enormous rivers of tropical America and its numberless lagoons might be expected to be capable of supporting Ducks in any quantity. But such is not the case. The intertropical species are almost all of them arboreal in their habits; and it may possibly be that this is so because they thus escape being preyed upon by the large Crocodilians which abound in these waters.

The bulk of the peculiar South-American species are not found to the northward of the lower portion of the basin of the La Plata. Here, however, and onwards to Tierra del Fuego they abound, not only in species but in individuals, and their numbers would seem to rival those of the northern hemisphere. But the component species, and, in many instances, the genera, are quite different. Swans are there, but the species bear no resemblance to those of the north. The Geese are all different. *Anas* is there, but differing widely from the northern prototype. The same may be said of *Dafila*, where the sexes are similarly dressed, instead of being widely different. *Mareca* is also there; but here, again, the sexes are nearly alike, instead of the reverse. The Teals, too, of the south are very different from those of the north. The host of northern diving and oceanic species are doubtfully represented by the two aberrant genera *Metopiana* and *Tachyeres*; and the Andean *Merganetta* stands quite alone.

The Shovellers (*Spatula*) of north and south are strictly congeneric; so also are the members of the genera *Erismatura* and *Mergus*.

Returning to the strictly tropical members of this family, and tracing their alliances and range, we find some remarkable facts in geographical distribution, which, so far as we are aware, find no parallel amongst birds. The genus *Chenalopex* contains but two species—one belonging to the valley of the Amazons and the adjoining districts, the other to Africa. *Sarcidiornis* is found in Paraguay, Africa, Madagascar, the peninsula of India, Ceylon, and Burmah. *Dendrocygna viduata* is common to both the American and African continents; and *D. fulva* is found alike in America, India, and Madagascar. The causes of this singular distribution of so many members of one family are at present inexplicable.

The greater part of our characters in the following synopsis are taken from specimens in the collection of Salvin and Godman, which contains most of the known South-American species. In selecting specimens for description we have sought out such as came from the same or the nearest locality to that where the original types were procured.

III. Synopsis of the Species of Neotropical Anatidæ.

The Anatidæ may be divided into the following seven subfamilies:—

I. *Anserinæ* or Geese.
II. *Cygninæ* or Swans.
III. *Anatinæ* or River-ducks.
IV. *Fuligulinæ* or Sea-ducks.
V. *Erismaturinæ* or Lake-ducks.
VI. *Merganettinæ*, or Torrent-ducks.
VII. *Merginæ* or Mergansers.

Subfamily I. Anserinæ.

Genus 1. Anser.

	Type.
Anser, Cuv. Règn. An. i. p. 530 (1817)	*A. cinereus*.
Chen, Boié, Isis, 1822, p. 563	*A. hyperboreus*.

Anser is strictly an arctopolitan form, of which winter visitants belonging to three species occur in the Antilles.

1. Anser hyperboreus.

Anser hyperboreus, Pallas, Spic. Zool. vi. p. 31 (1769); Zoogr. vol. ii. p. 227, t. 65; Baird, B. of N. Am. p. 760 (1858); Cab. J. für Orn. 1857, p. 225 (Cuba); March, Pr. Ac. Phil. 1864, p. 70 (Jamaica).

Chen hyperboreus, Gundl. Repert. F.-N. i. p. 387, et J. für Orn. 1875, p. 371 (Cuba).

Hab. Cuba (*Gundlach*); Jamaica (*March*).

In Cuba *A. hyperboreus* seems to be a regular annual visitant, and is common, remaining in the island from October until the end of March. It has only been observed in Jamaica when the winter in the north has been severe.

2. ANSER CÆRULESCENS.

Anas cærulescens, Linn. S. N. i. p. 198 (1766).

Anser cærulescens, Elliot, B. of N. Am. t. 43; Bryant, Pr. Bost. Soc. N. H. xi. (1866) p. 70 (Inagua).

Chen cærulescens, Gundl. Repert. F.-N. i. p. 387, et J. für Orn. 1875, p. 374 (Cuba).

Hab. Inagua, Bahama Island (*Bryant*); Cuba (*Gundlach*).

Dr. Bryant reports that, some years before his visit to Inagua in 1859, a flock of this Goose visited the island, when every individual was killed by the inhabitants. Dr. Gundlach, who maintains the distinctness between this bird and *A. hyperboreus*, says that it is of rare occurrence in Cuba, but that it arrives along with the migratory flocks of the allied species.

3. ANSER GAMBELI.

Anser gambelii, Hartl. Rev. Zool. 1852, p. 7; Baird, B. of N. Am. p. 761 (1858); Cab. J. für Orn. 1857, p. 226 (Cuba); Gundl. Repert. F.-N. i. p. 387, et J. für Orn. 1875, p. 375 (Cuba); Lawr. Mem. Bost. Soc. N. H. ii. p. 313 (Mazatlan).

Hab. Cuba (*Gundlach*); Mazatlan (*Grayson*).

Not common, but not so rare in Cuba as *A. cærulescens*, where, however, it is stated to be a regular winter visitant, remaining in the island from October till the end of March. Col. Grayson obtained it near Mazatlan, N.W. Mexico.

Genus 2. BERNICLA.

	Type.
Bernicla[*], Boié, Isis, 1822, p. 563	*B. torquata* (= *B. canadensis*).
Chloëphaga, Eyton, Mon. Anatidæ, p. 13 (1838)	*B. magellanica.*
Tænidiestes, Reich. Nat. Syst. d. Vög. p. ix (1852)	*B. antarctica.*
Chlœtrophus, Bannister, Pr. Ac. Sc. Phil. 1870, p. 131	*B. poliocephala.*
Oressochen, Bannister, Pr. Ac. Sc. Phil. 1870, p. 131	*B. melanoptera.*

Bernicla is a widely extended form, with four or five representatives in North America, of which one reaches the Neotropical region as an occasional winter visitant, and with six peculiar species in Antarctic America.

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[*] Some attempts have recently been made to revive *Branta* of Scopoli (Ann. I. H. N. p. 67) for this genus. But *Branta* of Scopoli is an artificial group composed of species which have no sort of natural affinity, and is therefore to be cancelled. Besides *Branta* is generally used for *Fuligula rufina*, and it would create great confusion to substitute it for the universally accepted term *Bernicla*.

1. BERNICLA CANADENSIS.

Anas canadensis, Linn. S. N. i. p. 198 (1766).

Bernicla canadensis, Baird, B. of N. Am. p. 764 (1858); March, Proc. Ac. Phil. 1864, p. 70 (Jamaica); A. & E. Newton, Ibis, 1859, p. 368 (St. Croix?).

Anser parvipes, Cass. Pr. Ac. Phil. vi. p. 188 (1852), (Vera Cruz).

Bernicla canadensis, var. *occidentalis*, Lawr. Mem. Bost. Soc. N. H. ii. p. 271 (Durango).

Hab. Jamaica (*March*); Durango, Mexico (*Grayson*).

An occasional visitant in Jamaica in winter, its occurrence depending upon the rigour of that season in the north. Messrs. A. & E. Newton think that a flock of wild Geese seen in the Island of St. Croix in 1857 probably belonged to this species. *Anser parvipes*, from Vera Cruz, is only known to us from Cassin's description, but may probably belong to *B. canadensis*. Durango is the only other recorded Mexican locality for it. Col. Grayson here met with it.

2. BERNICLA MELANOPTERA.

Anser melanopterus, Eyton, Mon. Anat. p. 93 (1838) (Lake Titicaca); Darwin, Voy. Beagle, iii. p. 134, t. 50 (1841); Schl. Mus. des P.-B., Anseres, p. 100; Tschudi, F. P. p. 308 (1846) (Puna reg. of Peru).

Bernicla melanoptera, Gay, Faun. Chil. p. 443 (1848) (Chili); Reich. Natat. lviii. f. 953; Bibra, Denkschr. Akad. Wien, v. p. 131; cf. J. für Orn. 1855, p. 57 (Chili); Cassin, Gilliss's Exp. ii. p. 101 (1856) (Chili); Phil. & Landb. Wiegm. Arch. 1863, p. 185, et Cat. Av Chil. p. 40 (Chili); Scl. Ibis, 1864, p. 121; P. Z. S. 1867, pp. 320, 334, 339 (Chili); Scl. & Salv. P. Z. S. 1869, p. 156 (Pitumarca).

Chloëphaga melanoptera, Burm. La Plata-Reise, ii. p. 513, et P. Z. S. 1872, p. 365.

Oressochen melanopterus, Bannister, Proc. Ac. Phil. 1870, p. 131.

Anser montanus, Tsch. Wiegm. Arch. ix. pt. i. p. 390.

Anser anticola, Tsch. Wiegm. Arch. x. pt. i. p. 315 (1844).

Alba; remigibus nigris; scapularibus et cauda viridescenti-nigris; tectricibus alarum majoribus extus purpureis, speculum formantibus; minoribus albis; scapularibus anterioribus fusco notatis, posterioribus fuscis in viridescenti-nigrum trahentibus: long. tota circ. 30, *alæ* 17·5, *caudæ* 6·5, *rostri a rictu* 1·7, *tarsi* 3·7, *dig. med. cum ungue* 3·3 (Descr. exempl. ex Peruviâ in Mus. S. & G.): *rostro (ave viva) carneo, ungue nigricante, pedibus rubris, irideo bscura.* Fem. *mari similis, sed minor.*

Hab. Lake Titicaca (*King, Pentland*); Puna region of Peru (*Tschudi*); Tinta, S. Peru (*Whitely*); cordillera and plains of Chili (*Ph. et Landb.*); Quintero, Chili (*Gay*); Portillo Pass, Chili (*Gilliss*).

This fine goose is found in the high Andes of Peru and Bolivia, and has been observed both on Lake Titicaca and at Tinta and Pitumarca, at an elevation of from 11,000 to 14,000 feet above the sea-level, in what Tschudi has termed the "Puna region." It is also found throughout the central provinces of Chili, descending to the plains in winter, but in summer retiring to the high Cordillera, to the verge of the line of perpetual snow. It has been observed at Quintero, in the province of Santiago, and in such numbers, on a small body of water near the celebrated Portillo Pass, that the spot is called Valle de los Pinquenes, Pinquen being the native name of this species. The limit of its southern rangê probably hardly passes the 35th degree of south latitude.

There were three specimens of this fine species lately living in the menagerie of this Society (List Vert. Zool. Soc. 1872, p. 244); but none of them seemed to enjoy such good health in captivity as the other South-American Geese. The male is considerably larger than the female.

3. BERNICLA MAGELLANICA.

Oie des Terres magellaniques, Buff. Pl. Enl. 1006, undè

Anas magellanica, Gm. S. N. i. p. 505 (1788) (Straits of Magellan).

Anser pictus et *magellanicus*, Vieill. Enc. Méth. p. 117 (1823).

Chloëphaga magellanica, Eyton, Mon. Anat. p. 82 (1838); Darwin, Voy. Beagle, iii. p. 134 (1841) (Tierra del Fuego and Falkland Islands); Scl. P. Z. S. 1857, p. 128; 1858, p. 289; 1860, p. 387 (Falkland Islands); Gould, P. Z. S. 1859, p. 96; Abbott, Ibis, 1861, p. 157 (Falkland Islands); Scl. & Salv. Ibis, 1868, p. 189 (Straits of Magellan); 1870, p. 500 (Elizabeth Isle); Ph. & Landb. Cat. Av. Chil. p. 40.

Bernicla magellanica, Gay, Fauna Chil. p. 443 (1848) (Chiloe).

Painted Duck, Cook, It. i. p. 96, unde

Anas picta, Gm. S. N. i. p. 504 (1788) (Staaten Island).

Anas leucoptera, Gm. S. N. i. p. 505 (1788); ex Buff. xvii. p. 101, et Brown's Ill. t. 40 (Falkland Islands).

Anser leucopterus, Vieill. Enc. Méth. p. 113 (1823).

Bernicla leucoptera, Less. Traité d'Orn. p. 627 (1831).

Alba, hypochondriis et dorso superiore cum parte basali colli postici nigro transvittatis; primariis, tectricibus alarum majoribus, tertiariis et scapularibus elongatis cinerascentibus; dorso postico et rectricibus cinerascenti-nigris; rostro nigro, iride fere nigra, pedibus obscure plumbeis: long. tota circ. 26, *alæ* 16·3, *caudæ* 5·5, *rostri a rictu* 1·6, *tarsi* 3·8, *dig. med. cum ungue* 3·3. Fem. *capite et collo cinnamomeis; gastræo antice cinnamomeo, postice albo, omnino nigro transvittato; subcaudalibus lateralibus nigris, mediis fusco irroratis; dorso antico cervino et albo transvittato, postico et rectricibus brunnescenti-nigris: primariis fusco-nigris, secundariis albis, tertiariis et scapularibus elongatis grisescentibus; tectricibus alarum majoribus æneis, vitta subapicali nigra, albo terminatis; rostro nigro,* *iride fere nigra, pedibus flavis: long. tota circ.* 26, *alæ* 16, *caudæ* 5·5, *rostri a rictu* 1·6, *tarsi* 3·3, *dig. med. cum ung.* 3 (Descr. exempl. ex Ins. Falklandici in Mus. S. & G.).

Hab. Straits of Magellan (*King, Darwin, Cunningham*): Staaten Island (*Cook*): Falkland Islands (*Darwin, Abbott*).

According to Darwin, this Goose is found in Tierra del Fuego and the Falkland Islands, being common in the latter. They live in pairs or small flocks in the interior of the island, and seldom approach either the sea or the freshwater lakes. They build on the outlying islets, probably through fear of the foxes; and the same cause may also account for their being tame by day but the reverse on the approach of dusk. They live entirely on vegetable matter, and are called by the seamen "Upland Geese."

Capt. Abbott, who, like other travellers, found this species common in East Falkland, says that it breeds all over the country, as well as on the adjoining islets—and on this point differs from Mr. Darwin; but he adds that the disappearance of foxes from East Falkland may have led to a change of habits as regards the situation chosen by this species for its nest. He gives a good account of its nesting-habits.

This species appears to do well in captivity, and many broods have been reared in the Gardens of this Society since its introduction in 1857 (Rev. List of Vert. Zool. Soc. 1872, p. 245).

The Chilian form of this Goose has been described by Philippi and Landbeck as *Bernicla dispar*—the main and, in fact, the only distinction consisting in the male being distinctly barred with black on the under surface. Our immature male specimen from the Falklands is marked to a slight extent in a similar manner; and we are disposed to consider the character one of hardly sufficient value to separate the two forms specifically. The following references belong to the Chilian form:—

4. BERNICLA DISPAR.

Bernicla magellanica, Cassin, Gilliss's Exp. ii. p. 201, t. xxiv. (1856); Gay, Fauna Chil. p. 443 (1848) (Chiloe).

Bernicla dispar, Ph. & Landb. Wiegm. Arch. 1863, p. 190, et Cat. Av. Chil. p. 40; Burm. P.Z.S. 1872, p. 366; Sclater, Ibis, 1864, p. 122.

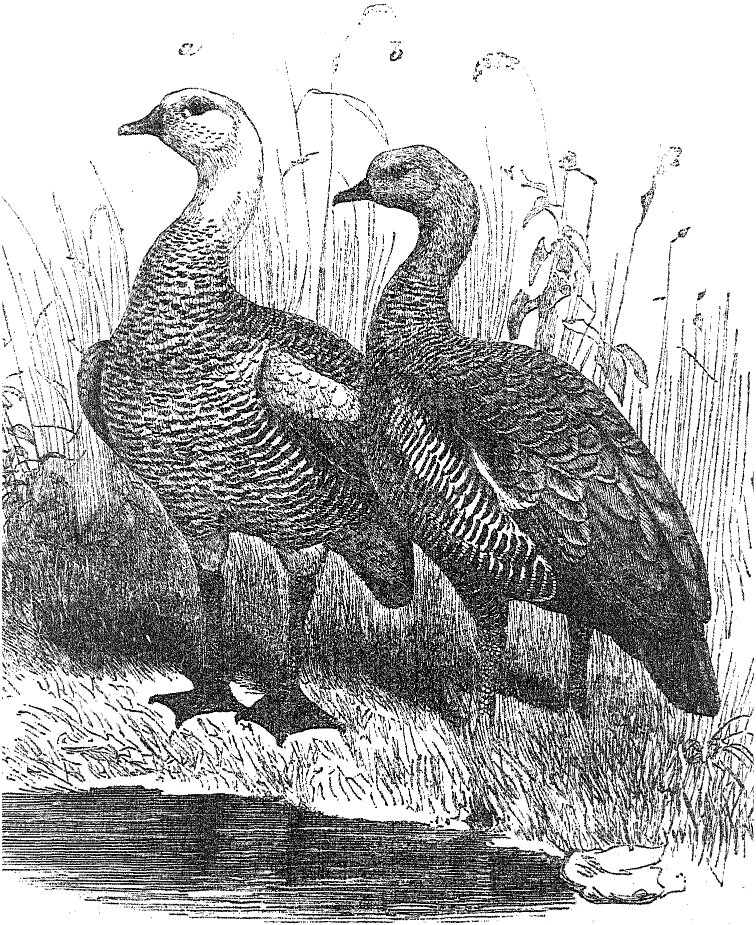
Chloëphaga dispar, Scl. P.Z.S. 1867, pp. 320, 334.

Hab. Central Chili (*Ph. et Landb.*); Argentine Republic, Sierra Tinta and Rio Negro (*Burm.*).

Philippi and Landbeck state that this Goose is of frequent occurrence in winter in the central provinces of Chili, and that one of the collectors for the Museum of Santiago brought a specimen from the Straits of Magellan.

Burmeister refers the Goose frequenting the Sierra Tinta, near Tandil, to the southward of Buenos Ayres, to this species or race; he also adds that he has recently received both sexes from El Carmen, on the Rio Negro.

In October 1871 the Society purchased of Mr. Weisshaupt, along with other Chilian animals, a pair of this form of the Magellanic Goose. The female unfortunately died; but the male was lent to a correspondent, who returned to the Gardens in its place, in November 1875, a pair of young birds, bred between it and a female *B. magellanica vera*, of which we exhibit a drawing. The male, it will be observed, is not quite so strongly barred as in the pure *B. dispar*, but presents well-defined black edgings on the under plumage. The females of the two forms are, so far as we can see, quite identical.



a, Male, and *b*, Female, Magellanic Geese in the Society's Gardens, bred between *B. dispar* ♂ and *B. magellanica* ♀.

5. BERNICLA POLIOCEPHALA.

Anas inornatus ♀, King, P. Z. S. 1830–31, p. 15 (Straits of Magellan).

Bernicla inornata, Gray & Mitch. Gen. B. t. 165; Gay, Faun. Chil. i. p. 444.

Chloëphaga poliocephala, Gray, List Gall. Grall. and Anseres in B. M. p. 127 (1844), descr. nulla; Scl. P. Z. S. 1857, p. 128; 1858, p. 290; 1861, p. 46 (Falkland Islands); 1867, p. 335; Abbott, Ibis, 1861, p. 159 (Falkland Islands); Scl. & Salv. Ibis, 1868, p. 189 (Oazy Harbour); 1870, p. 499 (Port Grappler); Nomencl. p. 128.

Bernicla poliocephala, Burm. P. Z. S. 1872, p. 366 (Bahia Blanca).

Anser poliocephalus, Schl. Mus. des P.-B., Anseres, p. 101.

Chlœtrophus poliocephalus, Bann. Pr. Ac. Phil. 1870, p. 131.

Bernicla chiloensis, Ph. & Landb. Wiegm. Arch. 1863, p. 149 (Chiloe), et Cat. Av. Chil. p. 40.

Capite toto et collo cum scapularibus griseo-plumbeis, pectore et dorso superiore castaneis nigro transfasciatis; abdomine, tectricibus subalaribus, campterio et tectricibus minoribus albis; primariis nigris; secundariis albis, interioribus fusco in pogonio externo notatis; tectricibus alarum majoribus nigris, extus viridescenti-nitentibus, apicibus albis; dorso imo et cauda nigris, hypochondriis nigro et albo transfasciatis, crisso castaneo; rostro nigro, pedibus extus flavis intus fusco-nigris: long. tota 24, *alæ* 13·5, *caudæ* 5, *tarsi* 2·7, *dig. med. cum ung.* 2·5 (Descr. maris ex Patagonia (Rio Negro) in Mus. S. & G.). Fem. *mari similis.*

Hab. Straits of Magellan (*King, Cunningham*); Patagonia, Rio Negro (*Hudson*); Chiloe (*Philippi & Landbeck*); Falkland Islands (*Abbott, Leconte*).

This species was at first supposed to be the female of the bird described by Captain King as *Anas inornatus*, under which name an excellent figure of it was given by Gray and Mitchell in the 'Genera of Birds.' Mr. Gray was the first to detect the error and to give the present bird a MS. name; but he left it to Sclater to describe the species and make the distinctions clear. The fact of the similarity of the sexes in this and the next species has been abundantly shown by living birds which have reared broods in captivity in our Gardens. The species does not seem to be very common in the far south, as it escaped Mr. Darwin's notice; and in the Falkland Islands, the great rendezvous of these Geese, it would appear to be only a straggler.

During the three years Captain Abbott resided in the Falkland Islands he only observed three examples of this species; and these were obtained singly amongst flocks of "Upland Geese" (*B. magellanica*): he supposes that these birds were stragglers from the coast of Patagonia. F. Leconte, who was sent by this Society to the Falklands to obtain living animals, brought home one skin of this Goose.

Burmeister says the range of this Goose extends over the whole of Patagonia, where it is one of the most common species.

Philippi and Landbeck state that the true patria of their *B. chiloensis* is the island of Chiloe, where it breeds. During the winter it migrates further northward. At Ancud it may be seen in a domesticated state.

Dr. Cunningham obtained this Goose at Oazy Harbour, in the Straits of Magellan, but did not meet with it in the Falkland Islands.

6. BERNICLA RUBIDICEPS.

Bernicla inornata, Gray, Zool. Voy. Erebus and Terror, t. 24.

Chloëphaga rubidiceps, Scl. P. Z. S. 1860, p. 387, t. 163 (Falkland Islands); 1861, p. 46; Abbott, Ibis, 1861, p. 158 (Falkland Islands); Scl. et Salv. Nomencl. p. 128; Sharpe, Zool. Erebus and Terror, Birds, p. 37.

Anser rubidiceps, Schl. Mus. des P.-B., Anseres, p. 102.

Chlœtrophus rubidiceps, Bann. Pr. Ac. Phil. 1870, p. 131.

Corpore subtus cum capite toto et collo cinnamomeis, pectore et hypochondriis nigro transfasciatis, crisso nigro marginato; supra grisescens colli basi crebre nigro et cinnamomeo transfasciata, interscapulii plumis fascia subterminali nigra notatis; dorso imo, uropygio et cauda nigris viridescente vix tinctis; remigibus nigris, secundariis et tectricibus alarum minoribus albis; tectricibus majoribus extus æneo-viridibus albo terminatis: long. tota circ. 23, *alæ* 13·5, *caudæ* 4·5, *rostri a rictu* 1·5, *tarsi* 2·5; *dig. med. cum ungue* 2·8 (Descr. maris ex insulis Falklandicis in Mus. S. & G.). *Rostro nigro, iride fere nigra, tarsis extus flavis intus nigrescentibus* (Desc. av. in vivario Zool. Soc. Lond.).

Hab. Falkland Islands (*Abbott, Leconte*).

The "Brent Goose," as this species is called in the Falkland Islands, Captain Abbott says, is not so common as the other species, except in some places in the North Camp, where he saw large numbers in pairs.

The male is larger than the female, and frequents the edge of the nearest pool of water whilst the female is sitting on her nest amongst dry bushes. The eggs are usually five (rarely six) in number, and are laid the first week in October. The young birds attain the dress of maturity the first year, except that the wing-speculum is dull black instead of glossy green.

This species also does well in captivity, many broods having been reared since 1860, when the species was first introduced into this country alive (Rev. List of Vert. Zool. Soc. 1872, p. 245).

7. BERNICLA ANTARCTICA*.

Antarctic Goose, Forst. It. pp. 495, 518, undè

* BERNICLA INORNATA.

Anas inornatus, King, P. Z. S. 1830–31, p. 15 (Straits of Magellan).

Bernicla inornata, Gay, Faun. Chil. p. 444 (1856); Gray and Sharpe, Zool. Erebus and Terror, Birds, pl. 30.

Chloëphaga inornata, Scl. et Salv. Nomencl. p. 128; Sharpe, Zool. Erebus and Terror, Birds, p. 37.

Similis præcedenti sed minor, dorso angustius transfasciato; speculo alari, *Anas antarctica*, Gm. S. N. i. p. 505 (1788) (Tierra del Fuego); Schl. Mus. des P.-B., Anseres, p. 98.

Bernicla antarctica, Steph. Shaw's Zool. xii. p. 59; Eyton, Mon. Anat. p. 84 (1838); Darwin, Voy. Beagle, iii. p. 134 (1841) (Tierra del Fuego, Falkland Islands); Less. Voy. Coq. t. 50; Gay, Fauna Chil. p. 442 (1848); Reich. Natat. lvii. f. 397, 948; Bibra, Denkschr. Akad. Wien, v. p. 131 (Chili); *cf.* J. für Orn. 1855, p. 57; Cassin, Gilliss's Exp. ii. p. 200, t. xxiii. (1856) (coast of Chili); 1860, p. 388; 1867, pp. 320, 334, 339; Gould, P. Z. S. 1859, p. 96; Scl. & Salv. Ibis, 1869, p. 284 (Port Otway); 1870, p. 499 (Goods Bay); Nomencl. p. 128; Abbott, Ibis, 1861, p. 159 (Falkland Islands); Burm. La Plata-Reise, ii. p. 514, et P. Z. S. 1872, p. 366; Ph. & Landb. Wiegm. Arch. 1863, p. 199, et Cat. Av. Chil. p. 40.

Tæniadestes antarctica, Bannister, Pr. Ac. Phil. 1870, p. 132.

Anas hybrida, Mol. Storia, p. 213 (?); Gm. S. N. i. p. 502 (1788), ex Molina.

Anas magellanicus, Sparrm. Mus. Carls. t. 37.

> Mas *alba; rostro nigro, pedibus flavis: long. tota circ.* 24·0, *alæ* 15·0, *caudæ* 5·2, *rostri a rictu* 1·7, *tarsi* 3, *dig. med. cum ungue* 3·5 (Descr. exempl. vix adult. ex ins. Falklandicis in Mus. S. & G.). Fem. *brunneo-nigra; vertice et nucha brunneis, fronte, capitis lateribus et collo albo vermiculatis; dorso postico, uropygio et cauda albis; primariis nigris, secundariis et tectricibus alarum minoribus cum subalaribus albis; tectricibus majoribus viridescente extus terminatis, speculum alare formantibus: subtus pectore hypochondriis et ventre summo distincte albo transfasciatis, ventre imo cum crisso albis: long. tota circ.* 24·0, *alæ* 14·0, *caudæ* 5·3, *rostri a rictu* 1·7, *tarsi* 2·7, *dig. med. cum ungue* 3·2 (Descr. exempl. ex ins. Falklandicis in Mus. S. & G.).

Hab. Tierra del Fuego (*Forster, Darwin, Cunningham*); Straits of Magellan to Chiloe (*Darwin, Philippi & Landbeck*); Patagonia (*Burmeister, Hudson*); Falkland Islands (*Darwin, Abbott*).

This is one of the oldest known species of South-American *Anatidæ*, being alluded to by Forster and also apparently by the Abbé Molina, as well as in Pernety's 'Voyage.' The remarks of the first author led to the name given to it by Gmelin, by which it has since

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dorso imo et rectricibus fusco-nigris; pedibus flavis: long. tot. circ. 24, *alæ* 14·8, *cauda* 4·5, *tarsi* 3, *dig. med. cum ungue* 2·5, *rostri a rictu* 1·2.

Hab. Straits of Magellan (*King*).

Though the type specimen of this bird in the British Museum bears a general resemblance to a male *B. magellanica*, we are by no means sure that it may not ultimately prove to be merely an immature specimen of *Bernicla antarctica*, the size of the bill corresponding more closely with that of the last-named species. From this, however, it differs in having a black tail, and in other minor characters. The specimen is evidently immature; but not being able to assign it positively to any other species, we leave it for the present to stand as doubtful; at the same time we think it more than probable that it will eventually be found to belong to one of the above-mentioned *Berniclæ*.

been almost universally recognized. The bird described by Molina, and called *Anas hybrida*, which name was also adopted by Gmelin as apparently applying to a species distinct from his *A. antarctica*, probably refers to this species; and if so, Molina's name has the priority; but so vague are his descriptions, and so inapplicable the name he has chosen, that we must decline to disturb a title so firmly established as *antarctica*. Forster noticed this species in Tierra del Fuego, where it has since been seen by every traveller who has written on the birds of that district. Here Darwin found it, and also in the Falkland Islands and on the western coast of South America as far north as Chiloe. It lives exclusively on rocky parts of the sea-coast; hence the name, "Rock-Goose," given to it by sailors. In the deep and retired channels of Tierra del Fuego, says Mr. Darwin, the snow-white male, invariably accompanied by his darker consort, and standing close by each other on some distant rocky point, is a common feature in the landscape.

Captain Abbott confirms Mr. Darwin's observation as to the abundance of this Goose in the Falklands; he adds that he found it along the coast, and that the nest is placed a few yards from the shore, in an exposed place, and the female may sometimes be seen sitting on her eggs from a distance. The male bird remains stationed close by. The eggs are generally six or seven in number, and, during the absence of the female, are carefully covered with down from her breast.

Philippi and Landbeck give to this species the same range along the west coast as Mr. Darwin, adding that it is occasionally seen at Valdivia. Its eastern range, according to Burmeister's latest observations, does not extend northward of the inlet of Santa Cruz, where it winters.

Little success has at present attended the efforts to introduce this species into England. One individual has reached this country alive up to the present time. (See Rev. List of Vert. 1872, p. 245.)

Genus 3. CHENALOPEX.

	Type.
*Chenalopex**, Stephens, Gen. Zool. xii. pt. 2, p. 41 (1824)	*C. ægyptiaca.*

CHENALOPEX JUBATA.

Anser jubatus, Spix, Av. Bras. ii. p. 84, t. 108 (1825); Burm. Syst. Ueb. iii. p. 433.

Chenalopex jubata, Gray & Mitch. Gen. B. t. 164; Cab. in Schomb. Guiana, iii. p. 762; J. E. Gray, Knowsl. Menag. ii. t. xv.; Taylor, Ibis, 1864, p. 96 (Orinoco); Scl. & Salv. P. Z. S. 1866, p. 200 (Ucayali); Nomencl. p. 128; Pelz. Orn. Bras. p. 319.

Sarkidiornis jubata, Gray, Hand-l. iii. p. 74.

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* Mr. G. R. Gray (Hand-l. iii. p. 74) refers to "*Chenonetta*, Brandt, 1836," as synonymous with *Chenalopex*. But *Chenonetta* was proposed by Brandt (Descr. et Ic. An. Ross. fasc. i. p. 5) for *Anas jubata*, Latham, of Australia, not for *Anser jubatus*, Spix.

Anser polycomus, Cuv. in Mus. Paris; Less. Traité d'Orn. i. p. 627 (1831); Schl. Mus. des P.-B. Anseres, p. 95.

Anser pollicaris, Licht. in Mus. Berol.

Chenalopex pollicaris, Licht. Nomencl. p. 101.

Capite toto cum collo et pectore sordide albis, collo postico obscuriore; interscapulio fusco-nigro; dorso antico, scapularibus et hypochondriis castaneis; dorso imo alis et cauda purpurascenti-nigris, secundariis quinque internis macula magna alba, speculum alare formantibus, ornatis: tectricibus alarum majoribus viridescenti-nitentibus; abdomine medio et crisso albis, ventre imo utrinque nigro; rostro nigro mandibula nisi in apice flava; pedibus flavidis: long. totæ 20, *alæ* 11·5, *caudæ* 3·7, *tarsi* 3·7, *dig. med. cum ungue* 2·4 (Desc. spec. ex Amazonia Peruviana in Mus. S. & G.).

Hab. Valley of the Amazons (*Spix, Bartlett*); Guiana (*Schomburgk*); Orinoco (*Taylor*); Caiçara, Rio Guaporé et Rio Negro (*Natterer*).

The range of the species is restricted to the low-lying districts of the valley of the Amazons, and the adjoining countries of Guiana and Venezuela on the Orinoco, where, however, especially in the former region, it would appear to be abundant. Natterer obtained eight specimens during his journey, some on the head waters of the Madeira in Matogrosso, others on the Rio Negro.

Little has been recorded of the habits of this Goose. Schomburgk met with it in pairs frequenting sand banks; and Natterer states that the stomach of one he examined contained small seeds.

This species has its nearest ally in *C. ægyptiaca* of the African continent, with which it would appear to be strictly congeneric.

Subfamily II. CYGNINÆ.

Genus 1. CYGNUS.

	Type.
Cygnus, Meyer, Tasch. d. d. Vög. ii. p. 497 (1810)	*C. olor.*
Olor, Wagl. Isis, 1832, p. 1234	*C. musicus.*
Chenopsis, Wagl. Isis, 1832, p. 1234	*C. atratus.*
Coscoroba, Reich. Nat. Syst. d. Vög. p. x. (1852)	*C. coscoroba.*

Two species of Swan, both very distinct from any of their northern congeners, are found in Antarctic America.

1. CYGNUS NIGRICOLLIS.

Anas nigricollis, Gm. S. N. i. p. 502 (1788), ex Bougainville.

Anas melanocephala, Gm. S. N. i. p. 502 (1788), ex Molina.

Anas melanocorypha, Mol. Saggio, ed. 2, p. 199 (1810).

Anser melanocoryphus, Vieill. Enc. Méth. p. 108 (1823) ex Molina.

Cygnus nigricollis, Steph. Shaw's Zool. xii. p. 17; Eyton, Mon. p. 98 (1838); Hartl. Ind. Az. p. 27; Gay, Faun. Chil. p. 445, t. 14 (1848); Burm. Syst. Ueb. iii. p. 432; La Plata-Reise, ii. p. 512; Journ. für Orn. 1860, p. 266, et P. Z. S. 1872, p. 365;

Bibra, Denkschr. Akad. Wien, v. p. 131; cf. J. für Orn. 1855, p. 57; Scl. P. Z. S. 1859, p. 206, 1860, p. 388, 1867, pp. 334, 339; Abbott, Ibis, 1860, p. 159; Ph. & Landb. Cat. Av. Chil. p. 50; Scl. & Salv. P. Z. S. 1868, p. 145, et Ibis, 1869, p. 284 (Elizabeth Isle), et Nomencl. p. 139.

Cisne de cabeza negra, Az. Apunt. no. 425.

> *Albus; capite et collo cum striga postoculari et mento nigris; loris nudis: long. tota circ.* 48·0 *poll. angl., alæ* 17·5, *caudæ* 5·5, *rostri a rictu* 3·0, *tarsi* 3·5, *dig. med. cum ungue* 4.2 (Descr. exempl. ex inss. Falklandicis in Mus. S. & G.). *Rostro plumbeo, ungue albo; cera tumida ruberrima; iride fere nigra, pedibus pallide carneis (ave viva).*

Hab. Falkland Islands (*Abbott*); Straits of Magellan (*Bougainville, Cunningham*); La Plata (*Azara, Burmeister*); Chili (*Gay, Philippi & Landbeck*).

This Swan is abundant in the pampas of Buenos Ayres, and in the lower portion of the Argentine Republic, and thence southwards to Tierra del Fuego. It is also found in the Falkland Islands and along the western coast of South America beyond Valparaiso, perhaps almost up to the frontier of Bolivia. Dr. Cunningham observed both this species and *C. coscoroba* near Sandy Point in the Straits of Magellan, where they were breeding.

In the Falkland Islands the Black-necked Swan is found throughout the year, but is rather scarce and very wild. It seldom breeds on the main island, but retires to the adjacent islets for that purpose. Dr. Burmeister mentions its occurrence on the Paraná, and also states that it is found on the island of Santa Catharina off the coast of Brazil, this being probably nearly its most northern limit.

The Black-necked Swan has long been introduced into Europe; and seldom a year passes but one or more broods are reared in the Gardens of this Society.

2. CYGNUS COSCOROBA.

Anas coscoroba, Mol. Stor. Nat. Chili, p. 207; Gm. S. N. i. p. 503 (1788) ex Molina.

Anser coscoroba, Vieill. Enc. Méth. p. 112 (1823).

Cygnus coscoroba, Hartl. Ind. Az. p. 27; Eyd. & Gerv. Ois. de Favorite, in Mag. de Zool. 1836, p. 36; Gray and Mitch. Gen. of Birds, t. clxvi.; Gay, Faun. Chil. p. 446 (1848) (Chili); Burm. J. für Orn. 1860, p. 226, et La Plata-Reise, ii. p. 512 (Paraná); P. Z. S. 1872, p. 365; Scl. P. Z. S. 1867, pp. 334, 339 (Chili), 1860, p. 388 (Falklands); Abbott, Ibis, 1861, p. 159 (Falklands); Schl. Mus. des P.-B. Anseres, p. 83; Ph. & Landb. Cat. Av. Chil. p. 41; Scl. & Salv. Ibis, 1869, p. 284 (Rio Galegos); Nomencl. p. 129.

Cygnus anatoides, King, P. Z. S. 1830–31, p. 15 (Straits of Magellan); Eyton, Mon. Anat. p. 101 (1838).

Cygnus chionis, Ill. in Mus. Berol.; Licht. Nomencl. p. 101.

Coscoroba chionis, Bp. C. R. xliii. p. 648 (1856).

Ganso blanco, Az. Ap. no. 436 (La Plata), undè

Anser candidus, Vieillot, N. D. xxiii. p. 331 (1816), et Enc. Méth. p. 351 (1823).

Coscoroba candida, Reich. Nat. Syst. d. Vög. p. x.

> *Albus; primariorum apicibus nigris; loris plumosis; rostro lato anatiformi ruberrimo, ungue carneo; iride fere nigra; pedibus rubro-carneis* (*ave viva*) : *long. tota circ.* 40·0, *alæ* 17·5, *caudæ* 5·8, *rostri a rictu* 3·0, *tarsi* 3·5, *dig. med. cum ungue* 5·0 (Descr. exempl. ex Chilia in Mus. S. & G.).

Hab. Chili (*Molina, Gay, Philippi & Landbeck*); Straits of Magellan (*King, Cunningham*); Falkland Islands (*Abbott*); Buenos Ayres (*Azara, Burmeister*).

Burmeister observed the Coscoroba Swan in large numbers on the rivers Paraná and Salado, especially in the lagoons bordering the river near Santa Fé. During the winter, he says, it keeps in flocks like our Swan. He also observed it at Mendoza and in the large lakes of the Pampas.

Azara met with only two individuals of this species in Paraguay, and a small flock at about 28° S. lat. He says, however, that it abounds in enormous flocks in the lagoons bordering the La Plata.

The Coscoroba Swan is rare in Chili, according to Philippi and Landbeck, who, however, give no details respecting its range on the western coast, though they mention a young one having been brought to them from the Straits of Magellan.

Mare harbour is the only part of East Falkland where Capt. Abbott ever saw or heard of this species. At that spot there is usually a flock of eight or ten to be seen. They breed in the neighbourhood, young birds of about a month old having been observed.

Living specimens of this Swan were brought to England in 1870 and 1871, but as yet have not reproduced. A pair made a nest in the Society's Gardens; and eggs were laid in 1872, but no young birds were hatched.

Subfamily III. ANATINÆ.

Genus 1. DENDROCYGNA.

	Type.
Dendronessa, Wagl. Isis, 1832, p. 281 (nec Sw.). .	*D. arcuata.*
Dendrocygna, Sw. Class. Birds, ii. p. 365 (1837).	*D. arcuata.*
Leptotarsis, Eyt. Mon. Anatinæ, p. 29 (1838) . .	*D. eytoni.*

This genus is a good example of what may be called a Tropicopolitan group, being represented nearly everywhere within the tropics. In America four very distinct species are found, besides another that is scarcely more than a representative form.

1. DENDROCYGNA FULVA.

Penelope mexicana, Briss. vi. p. 390 (Mexico), undè

Anas fulva, Gm. S. N. i. p. 530 (1788); Vieill. Enc. Méth. p. 136 (1823); Max. Beitr. iv. p. 918; Wagl. Isis, 1831, p. 532;

Burm. Syst. Ueb. iii. p. 435; J. f. Orn. 1860, p. 226 (Tucuman); La Plata-Reise, ii. p. 514.

Dendrocygna fulva, Baird, Birds N. Am. p. 770, t. 63 (Fort Tejon, Cal.); Scl. P. Z. S. 1864, p. 301, and 1866, p. 149; Scl. & Salv. P. Z. S. 1869, p. 635 (Buenos Ayres), et Nomencl. p. 129; Schl. Mus. des P.-B. *Anseres*, p. 87; Pelz. Orn. Bras. p. 319 (1870); Burm. P. Z. S. 1872, p. 377 (Buenos Ayres); Lawr. Mem. Bost. Soc. N. H. ii. p. 313 (Mazatlan).

Anas virgata, Max. Reise, i. p. 322.

Pato roxo y negro, Az. Apunt. no. 436, undè

Anas bicolor, Vieill. N. D. v. p. 136; Enc. Méth. p. 356; Hartl. Ind. Az. p. 28; Léot. Ois. Trin. p. 514 (1866) (Trinidad).

Anas sinuata, Licht. in Mus. Berol.

Anas collaris, Merrem, in Ersch. u. Grub. Enc. sect. i. vol. xxxv. p. 31.

Dendrocygna major, Jerdon, Birds of Ind. iii. p. 790 (India); Scl. P. Z. S. 1866, p. 148 (Madagascar).

Castanea, pileo obscuriore, linea mediali colli postici nigra; dorso nigro, in parte anteriore castaneo transfasciato; alis et cauda nigris; tectricibus alarum minoribus obscure badiis, tectricibus supracaudalibus albis; plumis hypochondriorum elongatis, castaneis, fascia mediali alba nigro utrinque marginata ornatis; rostro et pedibus nigris: long. tota 18·0, *alæ* 8·5, *caudæ* 2·0, *rostri a rictu* 2·3, *tarsi* 2·0, *dig. med. cum ungue* 3·0 (Descr. spec. ex Mexico, in Mus. S. & G.).

Hab. Mexico (*Brisson, Grayson*); S.E. Brazil (*Max.*); Paraguay and Buenos Ayres (*Azara, Burmeister*); Montevideo (*Sellow*).

Dendrocygna fulva, according to Burmeister, is found in the eastern and northern districts of the La-Plata basin, on the rivers Uruguay and Paraná, and as far north as Tucuman; and Azara observed it both in Paraguay and in Buenos Ayres. In the Brazilian empire it was obtained by Prince Maximilian on the river Belmonte and also on the sea-coast near Porto Seguro; but although Burmeister states that it is found throughout Central Brazil, Natterer seems to have failed to secure specimens. It appears, so far as we know, to be absent from the basin of the Amazons and from the whole of the northern portion of the southern continent; nor is it found in Central America or in the West Indies. In Mexico it reappears, and would seem to be by no means rare, occurring from the Rio-Grande frontier and California to Mazatlan and the valley of Mexico. Singular as this distribution is, it is still more remarkable when we consider that there appear to exist no tangible grounds for separating the American bird from that called *D. major* by Jerdon, which ranges throughout the peninsula of India and is also found in Madagascar!

2. DENDROCYGNA AUTUMNALIS.

Red-billed Whistling Duck, Edw. t. 194 (West Indies), undè

Anas autumnalis, Linn. S. N. i. p. 205 (1766).

Dendrocygna autumnalis, Eyton, Mon. Anat. p. 109 (1838);

Baird, B. of N. Am. p. 770 (1858) (Texas); Cassin, Pr. Ac. Phil. 1860, p. 197 (R. Truando); Scl. P. Z. S. 1858, p. 360; Scl. & Salv. Ibis, 1859, p. 231; Taylor, Ibis, 1860, p. 315 (Lake Yojoa); Scl. & Salv. P. Z. S. 1864, pp. 299 (partim) & 372 (Panamá), et Nomencl. p. 129; Lawr. Ann. Lyc. N. Y. viii. p. 13 (Panamá), et ix. p. 143 (Costa Rica); Mem. Bost. Soc. N. H. ii. p. 313 (Mazatlan); Salv. Ibis, 1865, p. 193.

Capitis lateribus et gutture cinereis, hoc albicantiore, colli postici linea mediali brunnescenti-nigra; pileo (versus nucham obscuriore), collo inferiore et corpore toto antico cum dorso medio et scapularibus læte castaneo-brunneis, pectore paullo dilutiore; dorso postico, ventre toto et cauda nigris, ventre imo et tibiis albo variegatis, crisso fere albo; alis nigris, tectricibus alarum minoribus internis ochracescentibus, mediis canis, externis albis; remigibus (extimo excepto) in pogonio externo et remigum tectricibus lactescenti-albidis; rostro rubro, ungue nigro; pedibus flavis: long. tota 16·0, *alæ* 8·5, *caudæ* 2·8, *tarsi* 2·0, *dig. med. cum ungue* 2·6, *rostri a rictu* 2·0 (Descr. maris ex Panama in Mus. S. & G.).

Hab. Mexico (*Grayson*); Guatemala (*Salvin*); Honduras (*Taylor*); Costa Rica (*Arcé*); Panama (*M'Leannan*).

Latham's description of his *Anas autummalis* was based upon Edwards's plate 194; and upon reference to this figure we feel no doubt that a specimen of the Central-American form of this Duck was the subject of Edwards's drawing. Moreover Edwards says, in the text of his work, that his specimen was brought from the West Indies.

The birds described by Baird from the Rio Grande, on the Texan frontier, evidently agree with Central-American examples; but Baird seems to have had specimens of the South-American form also before him when writing his notes on this species in the 'Birds of North America.' He attributes the greyness of the lower neck and breast in a South-American specimen to greater maturity—a view which can hardly be maintained, seeing that this peculiarity is found, so far as our experience goes, *only* in examples from the southern part of America.

In Central America this species is only found in the hottest part of the country and in the lagoons near the sea-coast, especially in those which lie in such abundance along the Pacific coast of Guatemala. During Salvin's stay there in 1863 he not unfrequently saw small flocks of this Duck, and also obtained specimens. In Honduras Mr. Taylor found this Tree-Duck abundant on Lake Yojoa. From Costa Rica we have an example collected by Arcé on the Gulf of Nicoya; and at Panama, whence we also have a specimen, it is not uncommon. M'Leannan had a pair of this species alive when Salvin stayed at his Station at Lion Hill.

The bird found on the Truando by Lieut. Michler's party probably belongs to this race; but we cannot speak with certainty on this point. It may also extend its range along the west coast as far as

Guayaquil; but this, too, remains to be determined; nor can its eastward limit be as yet defined. The form found in Trinidad (as described by Léotaud) certainly belongs to the next species.

3. DENDROCYGNA DISCOLOR.

Dendrocygna autumnalis, Cab. in Schomb. Guian. iii. p. 762; Scl. P. Z. S. 1864, p. 299 (partim); Scl. & Salv. P. Z. S. 1866, p. 200 (Ucayali); Léot. Ois. Trin. p. 507 (1866) (Trinidad); Schl. Mus. des P.-B. *Anseres*, p. 92; Pelz. Orn. Bras. p. 320 (1870); Finsch, P. Z. S. 1870, p. 589 (Trinidad).

Canard Siffleur de Cayenne, Buff. Pl. Enl. 826.

Dendrocygna discolor, Scl. & Salv. Nomencl. p. 161 (1873).

Capite, collo antico, pectore et dorso superiore griseis, pileo obscuriore; gutture albicante, torque colli inferi indistinctè castaneo; dorso medio læte castaneo; ventre, alis et cauda nigris; tectricibus alarum minoribus internis ochracescentibus, mediis canis, externis albis; remigibus (extimo excepto) in pogonio externo et remigum tectricibus albis; crisso albo nigroque vario, rostro rubro, ungue nigro; pedibus flavis: long. tota 16·0, *alæ* 8·0, *caudæ* 2·5, *rostri a rictu* 2·2, *tarsi* 2·0, *dig. med. cum ungue* 2·5 (Descr. exmpl. ex Surinam in Mus. S. & G.).

Hab. Columbia, S. Martha (*Deppe, in Mus. Berol.*); Surinam (*Kappler*); Trinidad (*Léotaud*); Guiana (*Schomb.*); Cayenne (*Buffon*); Ucayali (*Bartlett*); Barra do Rio Negro, and Minas Geraes (*Natterer*).

Obs. Similis præcedenti, sed dorso superiore et pectore canis nec castaneis.

This southern form of *D. autumnalis* is distinguishable at a glance from that of Central America by the upper portion of the back being of a different colour from the middle and lower back—the former being of a grey tint, the latter rich chestnut-brown. In the northern form no such difference is apparent, the whole upper surface being of the same chestnut tint. The breast in the former bird also is greyish, and in the latter chestnut.

D. discolor, as we have proposed to term it, is found in the northern part of South America, extending from the littoral of Columbia and Guiana over the great Amazon valley, and occasionally ranging as far south as Mato Grosso and the interior of Minas Geraes, where specimens were obtained by Natterer.

4. DENDROCYGNA ARBOREA.

Anas arborea, Linn. S. N. i. p. 207 (1766); Gm. S. N. i. p. 540 (1788); Vieill. Enc. Méth. p. 141 (1823).

Dendrocygna arborea, Eyton, Mon. Anat. p. 110 (1838); Gosse, B. Jam. p. 395 (Jamaica); Cab. J. f. Orn. 1857, p. 227 (Cuba); Thienem. J. f. Orn. 1857, p. 157 (Cuba); A. & E. Newton, Ibis, 1859, p. 366 (St. Croix); Scl. P. Z. S. 1864, p. 300; March, Pr. Ac. Phil. 1864, p. 70 (Jamaica); Gundl. Repert. F.-N. i. p. 387

(1866) et J. für Orn. 1875, p. 375 (Cuba); Bryant, Pr. Bost. Soc. N. H. xi. (1866) p. 70 (Inagua); Schl. Mus. des P.-B. *Anseres*, p. 84; Scl. & Salv. Nomencl. p. 73.

Black-billed Whistling Duck, Edw. Glean. t. 193.

Canard Siffleur de la Jamaïque, Buff. Pl. Enl. 804.

Anas jacquini, Gm. S. N. i. p. 536, ex Jacquin, Beitr. p. 5. n. 3 (?).

Fusco-brunnea, capite ochracescentiore, nucha cum stria colli postici nigra, torque collari nigro variegata; dorsi plumis et tectricibus alarum marginibus pallidioribus ornatis, his quoque nigro maculatis; subtus gutture toto albo, pectore fulvescente, abdomine, præcipue in hypochondriis, albo nigroque variegato; dorso postico et cauda nigris; alis cinereis, remigibus fusco terminatis; rostro et pedibus nigris: long. tota 18·5, *caudæ* 3·0, *rostri a rictu* 2·2, *tarsi* 2·5, *dig. med. cum ungue* 2·8 (Descr. exempl. ex Jamaica in Mus. Brit.).

Hab. Cuba (*Gundlach*); Jamaica (*Gosse, March*); St. Croix (*Newton fr.*).

This Tree-duck is a resident in Cuba, where, according to Dr. Gundlach, it is common. It is said to rest during the day and to visit the lagoons towards dusk. It nests from June to September. Mr. March remarks that is a permanent resident in Jamaica, frequenting the lagoons and morasses where mangroves abound, and feeding by night as well as by day. The habits of this species in Jamaica are also fully described by Mr. Gosse (*l. c.*). Numerous flocks frequent the millet-fields in Jamaica from December to the end of February. They are described as beating down the corn as they descend in compact flocks, and then picking the grain from the ears trampled under foot, which they cannot otherwise reach as it stands erect. In this manner they do a considerable amount of damage. The species is easily tamed, but does not appear to breed in confinement.

In St. Croix the Messrs. Newton state that the "Mangrove-Duck" is pretty common; but they are unable to say for certain whether it breeds in the island. It is more often heard than seen, its habit being to resort to its feeding-ground at night and to rest during the day in the recesses of the mangrove-swamps.

5. DENDROCYGNA VIDUATA.

Anas viduata, Linn. S. N. i. p. 205 (1766); Jacquin, Beitr. i. p. 3, t. i.; Gm. S. N. i. p. 536 (1788) (Cartagena); Vieill. Enc. Méth. p. 132 (1823); Max. Beitr. iv. p. 921 (Brazil); Burm. Syst. Ueb. iii. p. 434.

Dendrocygna viduata, Eyton, Mon. Anat. p. 110 (1838); Cab. in Schomb. Guiana, iii. p. 762; Hartl. Ind. Az. p. 28; Tsch. F.P. p. 54; D'Orb. Voy. i. p. 448; Burm. La Plata-Reise, ii. p. 515 (Tucuman); J. f. Orn. 1860, p. 266; Gundl. Repert. F.-N. i. p. 388, J. für Orn. 1875, p. 377 (Cuba); Scl. P. Z. S. 1864, p. 299; Léot. Ois. Trin. p. 509 (1866) (Trinidad); Scl. & Salv. P. Z. S. 1866, p. 200 (Ucayali), 1869, p. 160 (Rep. Arg.), et Nomencl. p. 129; Schl. Mus. des

P.-B. *Anseres*, p. 90; Pelz. Orn. Bras. p. 319 (1870); Reinh. Fugl. Bras. Camp. p. 21 (1870) (Lagoa Santa).

Canard du Maragnon, Buff. Pl. Enl. 808.

Pato cara blanca, Az. Apunt. no. 435.

Facie tota et macula gutturali albis; nucha, collo antico, abdomine medio, cauda, dorso postico et alis nigris; collo postico et humeris castaneis; dorso medio et scapularibus brunneis, plumis singulis ochraceo marginatis; tectricibus alarum olivaceo-nigris; hypochondriis albo nigroque transfasciatis: rostro et pedibus nigris: long. tota 17·0, *alæ* 9·0, *caudæ* 2·5, *tarsi* 2·0, *dig. med. cum ungue* 2·6, *rostri a rictu* 2·2 (Descr. exempl. ex Columbia in Mus. S. & G.).

Hab. Columbia (*Mus. S. & G.*); Guiana (*Schomb.*); Rio Brancho (*Natt.*); Trinidad (*Léotaud*); Upper Amazons (*Bartlett*); Peru (*Tschudi*); Bolivia (*D'Orbigny*); Paraguay (*Azara*); Tucuman (*Burmeister*); Brazil (*Maximilian*); Rio Paraná and Cuyaba (*Natterer*); Lagoa Santa (*Lund*); Bahia (*Wucherer*); Cuba (*Gundlach*).

This species has a very wide range in South America; but though its casual appearance in Cuba has been recorded, it has never yet been met with in Central America. Commencing from the valley of the Magdalena it spreads over the whole continent, including the island of Trinidad, as far as the vicinity of Buenos Ayres. In Paraguay, Azara saw it in large flocks of as many as two hundred individuals and more. He notes its cry as "*bi-bi-bi*," which is uttered as it flies at all hours of the night. The members of a flock fly in a straight line or crescent.

Genus 2. SARCIDIORNIS.

	Type.
Sarcidiornis, Eyton, Mon. Anat. p. 20 (1838) ..	*S. melanonota.*

This genus appears to be truly Tropicopolitan, and is represented by two or three species or closely allied forms in India, Africa, and America.

SARCIDIORNIS CARUNCULATA.

"*Anas carunculata*, Ill.," Licht. Abh. Ak. Berlin, 1816–17, p. 176.

El Pato crestudo, Az. Apunt. no. 438.

Pato de crista, Max. Beitr. iii. p. 942.

Anser melanotus, Burm. Syst. Ueb. iii. p. 434.

Sarcidiornis regia, Hartl. Ind. Az. p. 27 (1847); Burm. La Plata-Reise, ii. p. 513 (Tucuman); J. f. Orn. 1860, p. 266; Scl. P. Z. S. 1867, p. 339, 1868, p. 532; Pelz. Orn. Bras. p. 319; Scl. & Salv. Nomencl. p. 129.

Hab. Paraguay (*Azara*); Tucuman (*Burmeister*); interior of prov. Bahia (*Maximilian*); Matogrosso and Barra do Rio Negro (*Natterer*).

We are unable to give a description of this species, as no authentic South-American examples are at present accessible to us. It is therefore not possible for us to give independent testimony as to the identity or distinctness of the birds found in South America, Africa, and India; but we have good reason to believe that the South-American form is really separable.

Hartlaub (*l. s. c.*) says there is no sufficient difference between American and Indian specimens; but v. Pelzeln distinguishes the American form from the African and Indian birds by its darker flanks.

The South-American bird has, as will be seen from the above quotations, usually been identified with the Pato Real, or *Anas regia* of Molina; but we now know that the *Sarcidiornis* does not occur at all in Chili, and that the "Pato Real" of that country is *Mareca chiloensis*, according to Philippi and Landbeck (Cat. Av. Chil. p. 95), though Molina's vague description may have had some reference to *Cairina moschata*. If, then, as would appear to be the case, the American bird is really separable from the Indian, the proper name for this species is *carunculata*—a term based by Illiger on Azara's *Pato crestudo*, and published by Lichtenstein in 1818.

The range of this Duck in South America is by no means extended; and it has seldom been noticed beyond the upper waters of the basin of the Paraná. It occurs, however, in the interior of Bahia, according to Prince Maximilian; and Natterer met with it at Barra do Rio Negro, on the Amazons, in July 1832.

Genus 3. CAIRINA.

Cairina, Fleming, Phil. of Zool. p. 260 (1822).
Moschatus, Less. Ind. Orn. i. p. 633 (1831).
Gymnathus, Nuttall, Man. Orn. ii. p. 403 (1834).

This genus contains a single form, originally American, but now introduced into the Old World and naturalized in many parts of the tropics.

CAIRINA MOSCHATA.

Anas moschata, Linn. S. N. i. p. 199; Max. Beitr. iv. p. 910 (Brazil); Schl. Mus. des P.-B. *Anseres*, p. 73.

Cairina moschata, Cab. in Schomb. Guiana, iii. p. 763; Tsch. F. P. p. 54; D'Orb. Voy. i. p. 111; Burm. Syst. Ueb. iii. p. 440 (Brazil), et La Plata-Reise, ii. p. 514 (Paraná and Tucuman); J. f. Orn. 1860, p. 266; Moore, P. Z. S. 1859, p. 65 (Honduras); Scl. & Salv. Ibis, 1859, p. 232 (Guatemala); P. Z. S. 1864, p. 373 (Panama), 1866, p. 200 (Ucayali), 1867, p. 979 (Pebas); Salv. Ibis, 1865, p. 198; Taylor, Ibis, 1860, p. 315 (Honduras); Léot. Ois. Trin. p. 521 (1866) (Trinidad); Pelz. Orn. Bras. p. 320 (1870); Reinh. Fugl. Bras. Camp. p. 21 (1870) (Lagoa Santa); Lawr. Mem. Bost. Soc. N. H. ii. p. 315 (Mazatlan).

Carina moschata, Eyton, Mon. Anat. p. 142 (1838).

Cairina sylvestris, Stephens, Zool. xiii. p. 69.

Anas marianæ, Shaw, Nat. Misc. ii. t. 69 (?).

El Pato Grande o Real, Az. Apunt. no. 437.

Le Canard musqué, Buff. Pl. Enl. 986.

Capite toto, collo, et corpore subtus brunneo-nigris, abdomine lineis albis angustissimis transvittato; dorso iridescente purpureo, plumis singulis nigro marginatis, scapularibus et tertiariis *elongatis cum cauda læte viridi-nitentibus; secundariis chalybeo-cæruleo indutis; primariis nigris; tectricibus alarum omnibus supra et subtus cum plumis axillaribus pure albis; hypochondriis viridi vix tinctis; rostri carunculis rubris, pedibus nigris: long. tota* 29·0, *alæ* 15·0, *caudæ* 7·5, *rostri a rictu* 2·6, *tarsi* 2·3, *dig. med. cum ungue* 3·8 (Descr. maris ex Guatemala, in Mus. S. & G.). Fem. *mari similis sed minor: long. tota* 25·0, *alæ* 12·5, *caudæ* 5·5, *rostri a rictu* 2·3, tarsi 1·8, *dig. med. cum ungue* 2·9.

Hab. Paraguay (*Azara*); Paraná and Tucuman (*Burmeister*); Lagoa Santa (*Reinhardt*); Bolivia (*D'Orbigny*); Peru (*Tschudi*); Brazil (*Maximilian, Burmeister*); Amazonia (*Bartlett, Hauxwell*); Guiana (*Schomburgk*); Trinidad (*Léotaud*); Panama (*M'Leannan*); Honduras (*Taylor*); Guatemala (*Salvin*); Mexico (*Grayson, Xantus*).

The Muscovy Duck, so well known in a domestic state nearly all over the world, is a native of the hottest portion of tropical America. It is usually found in lowland swampy districts; and where there are extensive forests it not unfrequently abounds. During the day the birds remain in the forest-swamps; but towards evening numbers may be seen sitting on the lower boughs of trees standing on the margin of a clearing.

In Guatemala, Salvin found this Duck abundant on the Pacific coast in lagoons near Santana Mixtan and also at Huamuchal. It is likewise met with on the Atlantic side on the Rio Polochic, and also between Lake Peten and Lake Yax-ha. Its extreme northern limit seems to be N.W. Mexico, where Col. Grayson found it at Mazatlan, and Xantus at Rio Zacatula.

Its southern range extends to the upper Paraná and Tucuman. It is not uncommon in Paraguay, according to Azara, although not found on the La Plata. It is to be seen usually in pairs or singly, but also in flocks of twenty or thirty. It always roosts in trees, usually resorting to the same trees night after night. The nest, in which from ten to fourteen eggs are deposited, is made in a hole or fork of a large tree at some elevation from the ground. It seeks its food not only in the rivers, but on moonlight nights resorts to the maize and corn-fields and also plucks up the roots of mandioca.

The native habitat of the Muscovy Duck was known to some of the earliest writers. The date of its introduction as a domesticated species into Europe and elsewhere does not appear to have been recorded, but doubtless dates back to soon after the Spanish conquests in America.

Genus 4. ANAS.

	Type.
Anas, Linn. S. N. i. p. 194 (1766)............	*A. boschas.*
Boschas, Sw. Class. B. ii. p. 367 (1837)	*A. boschas.*
Chauliodus, Sw. Faun. Bor.-Amer. p. 440 (1831)	*A. strepera.*
Ktinorhynchus, Eyton, Mon. Anat. p. 137 (1838)	*A. strepera.*
Chaulelasmus, G. R. Gray; Pr. Bonap. Geog. Comp. List of B. p. 58 (1838)	*A. strepera.*

Five species of true *Anas* (or, at least, not yet separated from the

Linnean type) occur within the Neotropical Region. Three of them are stray visitors from the north into the Antilles; the remaining two are peculiar Antarctic species.

1. ANAS BOSCHAS.

Anas boschas, Linn. S. N. i. p. 205 (1766); Baird, B. of N. Am. p. 774; Cab. J. f. Orn. 1857, p. 229 (Cuba); March, Pr. Ac. Phil. 1864, p. 72 (Jamaica); Gundl. Repert. F.-N. i. p. 388, et J. für Orn. 1875, p. 378 (Cuba); Scl. & Salv. Nomencl. p. 129; Lawr. Ann. Lyc. N. Y. viii. p. 13 (Panama) et Mem. Bost. Soc. N. H. ii. p. 314 (Mexico).

Anas maxima, Scl. P. Z. S. 1859, p. 370 (Mexico).

Hab. Cuba (*Gundlach*); Jamaica (*March*); Mexico (*De Oca, Grayson*); Panama (*M'Leannan*).

According to Dr. Gundlach, *A. boschas* is rarely seen wild in Cuba; but in 1870 a flock on passage from the north settled in the lagoons near Cardenas, and the bird is occasionally to be seen in the market of Havana. Mr. March says it is rare in Jamaica. In Central America it has been recorded from Mexico and Panama, but nowhere else.

2. ANAS OBSCURA.

Anas obscura, Gm. S. N. i. p. 541 (1788); Baird, B. of N. Am. p. 775; Cab. J. f. Orn. 1857, p. 229 (Cuba); March, Pr. Ac. Phil. 1864, p. 72 (Jamaica); Scl. & Salv. Nomencl. p. 129; Lawr. Mem. Bost. Soc. N. H. ii. p. 314 (Mexico).

Hab. Jamaica (*March*); Tepic, Mexico (*Grayson*).

The Dusky Duck is said to be of rare occurrence in Jamaica. In Cuba, Dr. Gundlach formerly suspected its occasional presence, but does not mension it in his last 'Revista de las Aves Cubanas.' In Mexico it has hitherto only been noticed at Tepic by Grayson.

3. ANAS SPECULARIS.

Anas specularis, King, Zool. Journ. iv. p. 98 (1828); Eyton, Mon. Anat. p. 138 (1838); Jard. & Selb. Ill. Orn. iv. tab. 40; Gay, Faun. Chil. p. 450; Cassin, Gilliss's Exp. ii. p. 202; Scl. P. Z. S. 1867, p. 335 (Chili); Ph. & Landb. Cat. Av. Chil. p. 42; Scl. & Salv. Nomencl. p. 129.

Anas chalcoptera, Kittlitz, Mém. prés. Acad. St. Pétersb. ii. p. 471, t. 5 (1835); Schl. Mus. des P.-B., *Anseres*, p. 46; Gray, Hand-l. iii. p. 82.

Supra chalybeio-nigra, cervice postica et uropygio fumoso-brunneis; dorsi superioris plumis hoc colore marginatis; capite toto et nucha nigris, plaga magna faciali utrinque et gutture medio in semitorquem collarem transeunte distinctissime albis; subtus valde dilutior et rufescentior, et fasciis transversis rufis in pectore variegata; alis et interscapulio chalybeio-nigris; speculo alari lato viride cupreo, hujus parte distali velutino-nigra margine albo terminata; hypochondriis æneo-nigro maculatis;

plumis axillaribus albis; rostro obscuro, pedibus flavis: long. tota 21·0, *alæ* 11·0, *caudæ* 4·8, *tarsi* 1·9, *rostri a rictu* 2·3.

Fem. *mari similis, sed coloribus minus claris.*

Hab. Magellan Straits (*King*); Southern and Central Chili (*Phil. & Landb.*).

This Duck is very remarkable for its conspicuous white patch on each side of the face and pure white throat and neck, as well as the large richly coloured alar speculum. So far as we yet know, it is exclusively a western species. According to Philippi and Landbeck it [illegible] common from the Straits of Magellan as far north as Valdivia, but is rare in the central provinces of Chili.

4. ANAS CRISTATA.

Crested Duck, Lath. Syn. iii. p. 543, undè

Anas cristata, Gm. S. N. i. p. 540 (1788) (Statenland); Gay, Faun. Chil. p. 449 (1848); Gould, P. Z. S. 1859, p. 96 (Falklands); Scl. P. Z. S. 1860, p. 389 (Falklands), 1867, p. 335 (Chili); Abbott, Ibis, 1861, p. 160 (Falklands); Ph. & Landb. Cat. Av. Chil. p. 41; Scl. & Salv. P. Z. S. 1867, p. 990 (Salinas, Peru); Ibis, 1870, p. 499 (Tuesday Bay), et Nomencl. p. 129; Schl. Mus. des P.-B. *Anseres*, p. 39.

Anas specularoides, King, Zool. Journ. iv. p. 98 (1838).

Anas pyrrhogaster, Meyen, Nov. Act. xvi. Suppl. p. 119, t. xxv. (Maipu, Chili).

Dafila pyrrhogaster, Eyton, Mon. Anat. p. 113 (1838).

Supra terreno-fusca, colore pallidiore in dorso superiore variegata; pileo fuscescenti-nigro in cristam elongatam desinente; speculo alari lato cupreo-viridi, parte distali nigra, fascia externa alba terminata; subtus fusca, magis rufescens et maculis indistinctis in pectore notata; crisso et subalaribus fere nigris, harum plaga media alba; rostri maxilla nigra, mandibula flava, pedibus nigris: long. tota 20·0, *alæ* 10·5, *caudæ* 5·0, *rostri a rictu* 2·1, *tarsi* 1·8, *dig. med. cum ungue* 2·4.

Hab. Falklands (*Abbott*); Magellan Straits (*Cunn.*); Chili (*Ph. & Landb.*); S. Peru (*Whitely*).

This species has a wider range than the last, extending northwards into Southern Peru, where Mr. Whitely obtained specimens in 1867 at Salinas, a salt lake on the Cordillera, above Arequipa, at an altitude of 14,000 feet. In Chili, Philippi and Landbeck tell us, it inhabits the high cordilleras in summer, but descends during winter to the plains, and is found along the coast down to the Magellan Straits, where Dr. Cunningham obtained specimens.

The Crested Duck is common everywhere on the Falkland islands, mostly frequenting salt water, though occasionally seen near freshwater pools. Old birds are always found in pairs. They live upon shellfish. They retire inland to breed; and the duck lays five eggs, in a nest covered with down. The eggs are laid from the beginning of October to the beginning of November.

The only near ally of this Duck in the Neotropical region is the preceding species, from which it may be at once distinguished by the absence of the conspicuous white face-markings and the small crest. It is, no doubt, the *Anas specularoides* of King.

5. ANAS STREPERA.

Anas strepera, Linn. S. N. i. p. 100 (1766); Scl. & Salv. Nomencl. p. 129.

Chaulelasmus streperus, Baird, B. of N. Amer. p. 782; March, Pr. Ac. Phil. 1864, p. 72 (Jamaica); Gundl. Repert. F.-N. i. p. 389, et J. für Orn. 1875, p. 381 (Cuba); Lawr. Mem. Bost. Soc. N. H. ii. p. 315 (Mexico).

Hab. Cuba (*Gundl.*); Jamaica (*March*); Mexico (*Grayson*).

The occurrence of a single male bird of this species in the market of Havana is the sole authority for its admission into the list of Cuban birds. In Jamaica, however, Mr. March says, it is sometimes abundant, but of irregular occurrence. Its presence in Mexico is confined to the N.W. provinces, where Grayson observed it.

Genus 5. HETERONETTA. Type.

Heteronetta, Salvadori, Atti de la Soc. Ital. d. Sci. Nat. viii. p. 574 (1865) .... *H. melanocephala.*

This is certainly an aberrant form of *Anas* in many respects; and Dr. Salvadori is probably correct in isolating it. Schlegel even goes so far as to put it with the *Fuligulæ*; but before accepting this view, we require a knowledge of its tracheal formation.

HETERONETTA MELANOCEPHALA.

Pato cabeza negra, Az. Apunt. no. 438 (Buenos Ayres), undè

Anas melanocephala, Vieill. N. D. v. p. 163 (1816), et Enc. Méth. p. 354 (1823); Hartl. Ind. Az. p. 28; Cassin, Gilliss's Exp. ii. p. 202, t. xxv. (1856); Scl. P. Z. S. 1867, p. 335 (Chili); Phil. & Landb. Cat. Av. Chil. p. 42; Scl. & Salv. Nomencl. p. 129.

Heteronetta melanocephala, Salvad. Atti Soc. Ital. viii. p. 374 (1866).

Fuligula melanocephala, Schl. Mus. des P.-B. *Anseres*, p. 32.

Anas nigriceps, Licht. in Mus. Berol.; Nomencl. p. 101.

Anas atricapilla, Merrem, in Ersch. u. Grub. Enc. sect. i. vol. xxxv. p. 26.

Supra saturate nigricanti-fusca, rufescente minutissime vermiculata; capite colloque toto fuliginose nigris; secundariorum fascia terminali angusta alba; subtus sordide alba, in pectore summo hypochondriis et crisso rufescente irrorata; rostro nigricante, macula basali utrinque carnea; pedibus corneis: long. tota 14·5, *alæ* 6·3, *caudæ* 2·3, *tarsi* 1·1, *rostri a rictu* 2·0. Fem. *pileo dorso concolori, genis fuscis nigro vermiculatis, gula et stria superciliari indistincta albidis diversa.*

Hab. Buenos Ayres (*Azara*); Chili prov. of Santiago (*Ph. & Landb.*); Brazil, Rio Grande do Sul (*Max.*); Mendoza (*Weisshaupt*).

This peculiar Duck was first described by Azara, who "bought a pair in Buenos Ayres," where, however, Burmeister does not seem to have recognized it. Prince Maximilian tells us (Beitr. iv. p. 932) that he has received examples from Rio Grande do Sul; and Weisshaupt obtained a series of skins during his excursion from Santiago to Mendoza, some of which are in Salvin and Godman's collection.

In Chili, where it also occurs, Philippi and Landbeck say that up to the present time this species has not been found beyond the province of Santiago, and that the hunters confound it with *Erismatura ferruginea*.

Genus 6. QUERQUEDULA.

	Type.
Querquedula, Steph. Gen. Zool. xii. p. 142 (1824) ..	*Q. circia.*
Nettion, Kaup, Nat. Syst. p. 95 (1829)	*Q. crecca.*
Cyanopterus, Eyton, Mon. Anat. p. 130 (1838)	*Q. circia.*
Pterocyanea, Bp. Cat. Met. Ucc. Eur. p. 71 (1842)..	*Q. circia.*

Ten *Querquedulæ* (under which head we embrace the Teals and Garganeys) occur within the Neotropical region. Of these, two are northern species, which visit the Antilles and Central America in winter; the remaining eight are endemic Neotropical species, one of which, however, has extended its northern range into the southern portion of the Nearctic region.

The ten Neotropical *Querquedulæ* may be diagnosed as follows:—

a. Tectricibus alar. min. cæruleis.	
Plaga faciei utrinque alba..	1. *discors.*
Facie (cum corpore antico) rubra	2. *cyanoptera.*
b. Tectricibus alar. min. fuscis.	
b'. Pileo et cervicis lateribus in mare rubris	3. *carolinensis.*
c'. Pileo et cervicis lateribus nigro fasciolatis.	
c''. Rostro sup. ad basin flavo.	
Major: interscapulio dorso fere concolori...............	4. *oxyptera.*
Minor: interscapulio nigro variegato.....................	5. *flavirostris.*
d''. Rostro toto nigro	6. *andium.*
d'. Pileo fuscescenti-nigro; cervicis lateribus albis.	
Rostro superiore ad basin rubro	7. *versicolor.*
Rostro toto nigro	8. *puna.*
e. Tectricibus alar. min. nigris.	
Pileo nigro..	9. *torquata.*
Pileo fusco	10. *brasiliensis.*

1. QUERQUEDULA DISCORS.

Anas discors, Linn. S. N. i. p. 205 (1766).

Querquedula discors, Steph. Gen. Zool. xii. p. 149; Baird, B. of N. Am. p. 779; Cab. J. f. Orn. 1857, p. 228 (Cuba); Sallé, P. Z. S. 1857, p. 237 (S. Domingo); Scl. P. Z. S. 1857, p. 206 (Jalapa, Mexico), 1859, p. 393, 1860, p. 254 (Mexico); Scl. & Salv. Ibis, 1859, p. 231 (Guatemala), et Nomencl. p. 129; Salv. Ibis, 1865, p. 193; Gundl. Repert. F.-N. i. p. 389, et J. für Orn. 1875, p. 380 (Cuba); March, Pr. Acad. Phil. 1864, p. 71 (Jamaica); Lawr. Ann. Lyc. N. Y. viii. p. 101 (Sombrero), ix. (1868) p. 143 (Costa Rica); Mem. Bost. Soc. N. H. ii. p. 314 (Mexico); Bryant, Pr. Bost. Soc. N. H. xi. p. 97 (S. Domingo); Salvin, P. Z. S. 1870, p. 219 (Veragua).

Pterocyanea discors, Léot. Ois. Trin. p. 516 (Trinidad).

Cyanopterus discors, Tayl. Ibis, 1860, p. 315 (Honduras).

Hab. Cuba (*Gundl.*); Jamaica (*March*); St. Domingo (*Sallé, Bryant*); Sombrero (*Lawr.*); Trinidad (*Léotaud*); Mexico, Jalapa and Orizaba (*Sallé*); Mazatlan (*Grayson*); Guatemala (*Salvin*); Honduras (*Taylor*); Costa Rica (*Lawrence*).

In Cuba this is the commonest of the North-American migratory Ducks, arriving about the beginning of September and leaving the island again in April. In Jamaica Mr. March says he has never seen the "Bluewings" earlier than November, and that they again appear in full summer-plumage in March and April on their way to the north. This species is likewise met with in the other Antilles, as far down as Trinidad.

On the continent, *Q. discors* has been traced down as far as Veragua, as will be seen by our list of localities. In Guatemala, Salvin found it common in winter, arriving in September and leaving again in March and April. It is met with in the high and low districts alike, chiefly on the lakes.

2. QUERQUEDULA CYANOPTERA.

Pato alas azulas, Az. Apunt. no. 434 (La Plata, Buenos Ayres), undè

Anas cyanoptera, Vieill. N. D. v. p. 104 (1816), et Enc. Méth. p. 352 (1823); Merrem, in Ersch. & Grub. Enc. sect. i. vol. xxxv. p. 33; Burm. J. f. Orn. 1860, p. 226; La Plata-Reise, ii. p. 516 (Mendoza); Schl. Mus. des P.-B. *Anseres*, p. 51.

Querquedula cyanoptera, Cass. Ill. Orn. p. 84, t. xv. (Louisiana, Utah), et Gilliss's Exp. ii. p. 202 (1856); Baird, B. of N. Amer. p. 780; Scl. P. Z. S. 1855, p. 164 (Bogotá, St. Martha), 1856, p. 310 (Mexico), 1860, p. 389 (Falklands), 1867, p. 355 (Chili); Gould, P. Z. S. 1859, p. 96 (Falklands); Abbott, Ibis, 1861, p. 161 (Falklands); Scl. & Salv. P. Z. S. 1869, p. 160 (Buenos Ayres), et Ibis, 1868, p. 189 (Sandy Point).

Anas cæruleata, Licht. in Mus. Berol.; Bibra, Denkschr. Ak. Wien, v. p. 131 (1853) (Chili); cf. J. f. Orn. 1855, p. 57; Lawr. Ann. Lyc. N. Y. v. p. 220 (California).

Querquedula cæruleata, Gay, Faun. Chil. p. 452 (1848); Ph. & Landb. Cat. Av. Chil. p. 42.

Pterocyanea cæruleata, Hartl. Ind. Az. p. 27 (1847).

Anas rafflesi, King, Zool. Journ. iv. p. 97 (1828); Jard. & Selb. Ill. Orn. t. 23.

Cyanopterus rafflesi, Eyton, Mon. Anat. p. 132 (1838).

***Rubra**, pileo nigro; interscapulio et scapularibus nigro variegatis; dorso postico nigricante; alarum tectricibus minoribus cæruleis; speculo alari viridi, fascia alba supra marginato; remigibus primariis nigris, secundariorum scapis albo et ochraceo flammulatis; rostro nigro, pedibus flavis: long. tota* 18·0, *alæ* 7·6, *caudæ* 3·0, *tarsi* 1·3. Fem. *supra nigricans, plumarum marginibus albidis; subtus sordide alba, fusco variegata,* *gutture albo nigro punctulato; alarum tectricibus et speculo sicut in mari.*

Hab. Andes of Columbia (*Mus. S. G.*); St. Martha (*Verreaux*); Chili (*Ph. & Landb.*); Buenos Ayres (*Azara & Burm.*); Magellan Straits (*Cunningh.*); Falklands (*Abbott*).

This Duck, first discovered by Azara, has a very wide range in the New World, from the extreme south up to California on the west, and occurs accidentally in Louisiania. It was found by Azara only in the Rio de la Plata and Buenos Ayres; but Burmeister observed it at Mendoza and on the Paraná, in lagoons and rivers. Philippi and Landbeck say that it is frequently met with throughout the republic of Chili; and Dr. Cunningham obtained specimens in the Straits of Magellan. It seems not to be very common in East Falkland, though Capt. Abbott shot seven in one day at Mare Harbour. But it most probably breeds in these islands, as pairs were observed throughout the summer months.

In the eastern part of South America (that is, in Brazil, Amazonia, and Guiana) we do not find the occurrence of this Duck noticed; but it is certainly met with in the Andes of Columbia and on the northern littoral of Venezuela, and probably keeps to the line of the Andes. It has not yet been recorded from any part of Central America; but will probably be ultimately found there, as it is not uncommon in the Western United States and has occurred accidentally in Louisiana.

3. QUERQUEDULA CAROLINENSIS.

Anas carolinensis, Gm. S. N. i. p. 533 (1788).

Querquedula carolinensis, Steph. Gen. Zool. xii. p. 148; Baird, B. of N. Amer. p. 777; Jard. Ann. & Mag. N. H. xx. (1847) p. 377 (Tobago); Cab. J. f. Orn. 1857, p. 228 (Cuba); Moore, P. Z. S. 1859, p. 65 (Honduras); Scl. P. Z. S. 1857, p. 215, 1859, p. 370, 1860, p. 254 (Mexico); Scl. & Salv. Ibis. 1859, p. 231 (Honduras); Nomencl. p. 129.

Nettion carolinensis, March, Pr. Ac. Phil. 1864, p. 72 (Jamaica); Gundl. Repert. F.-N. i. p. 389, et J. für Orn. 1875, p. 381 (Cuba); Lawr. Mem. Bost. Soc. N. H. ii. p. 314 (Mexico).

Hab. Cuba (*Gundl.*); Jamaica (*March*); Tobago (*Kirk*); Mexico (*Sallé, De Oca, Grayson*); Honduras (*Dyson*).

The Green-winged Teal of the North-Americans occurs on passage in Cuba, but is rare. In Jamaica it is sometimes seen in autumn, but more generally in the spring. A single immature specimen was sent to Sir W. Jardine from Tobago by Mr. Kirk, who says that the species arrives in that island in October and November and departs in March or April. In Mexico it has been obtained at Mazatlan, Orizaba, and Jalapa. Leyland procured examples of it many years ago in Honduras, on the Aloor river. This is its furthest continental range to the south yet known to us.

4. QUERQUEDULA OXYPTERA.

Anas oxyptera, Meyen, Nov. Act. xvi. Suppl. p. 121, t. 26 (1833) (South Peru).

Querquedula oxyptera, Tsch. F. P. pp. 55, 309 (Sierra region of Peru); Scl. & Salv. P. Z. S. 1867, p. 990 (S. Peru), 1868, p. 570, 1869, p. 157 (Peru); Nomencl. p. 129.

Querquedula angustirostris, Ph. & Landb. Wiegm. Arch. 1863, pt. i. p. 202 (Tacna).

Supra pallide schistaceo-fusca, capite toto nigro frequenter transfasciolato; interscapulio rufescente lavato, plumis in centro obscurioribus; uropygio valde dilutiore; speculo alari lato nigro supra et subtus fascia ochracea terminato et fascia splendenti-æneo-viridi intus inclusa; remigibus obscure schistaceis, secundariorum marginibus utrinque pallide rufescentibus; abdomine albo, pectore nigro punctato; rostro flavo, culmine et apice nigris; pedibus corneis: long. tota 17·5, *alæ* 8·7, *caudæ* 4·0, *tarsi* 1·4, *rostri a rictu* 1·8.

Hab. Cordilleras of Peru, near Lake Titicaca (*Meyen*); Salinas above Arequipa (*Whitely*); Laguna of Cucullata above Tacna (*Frobeen*).

This Duck was first discovered by Meyen, who obtained specimens of it on the high cordillera of Peru, near Lake Titicaca. Meyen's name (*oxyptera*) having been wrongly applied to the next species, Philippi and Landbeck (as was pointed out by us in 1867) redescribed the bird in 1863 under the name *angustirostris*. Their specimens were obtained by Frobeen, on the Lake of Cucullata, in Southern Peru.

Our examples of this species were collected by Mr. Whitely on the salt lake of Salinas, situated at an elevation of 14,000 feet above Arequipa. Mr. Whitely subsequently procured other examples on the lagoon of Tungasuca and on the river near Tinta, in the district of Cuzco.

5. QUERQUEDULA FLAVIROSTRIS.

Pato pico amarillo y negro, Azara, Apunt. no. 439 (Buenos Ayres), *unde*

Anas flavirostris, Vieill. N. D. v. p. 107 (1816), et Enc. Méth. p. 353 (1823); Schl. Mus. des P.-B. *Anseres*, p. 59.

Querquedula flavirostris, Burm. J. f. Orn. 1860, p. 226, et La Plata-Reise, ii. p. 516 (Mendoza); Scl. & Salv. P. Z. S. 1868, p. 146 (Buenos Ayres), et Nomencl. p. 129.

Anas creccoides, King, Zool. Journ. iv. p. 99 (1828).

Querquedula creccoides, Eyton, Mon. Anat. p. 128 (1838); Gay, Faun. Chil. p. 453 (1848); Cassin, Gilliss's Exp. ii. p. 203, t. xxvi. (1856) (Chili); Darwin, Voy. Beagle, iii. p. 135 (1848); Scl. P. Z. S. 1860, p. 389 (Falklands), 1867, p. 335 (Chili); Gould, P. Z. S. 1859, p. 96 (Falklands); Ph. & Landb. Cat. Av. Chil. p. 42; Abbott, Ibis, 1861, p. 160.

"*Querquedula oxyptera*, Meyen," Reich. Nat. t. lii. f. 164; Bibra, Denkschr. Ak. Wien, v. p. 131 (1853); cf. J. f. Orn. 1855, p. 57 (Chili).

Similis præcedenti, sed minor, rostro breviore; interscapulii plumis in centro nigris, fuscescente ochraceo stricte marginatis; uro-

pygio paululum obscuriore; pectoris guttis magis distinctis et fere totum ventrem occupantibus; necnon alis et tarsis brevioribus distinguenda: long. tota 15·0, *alæ* 7·4, *caudæ* 3·5, *rostri a rictu* 1·65, *tarsi* 1·2.

Hab. Buenos Ayres (*Azara, Hudson*); Mendoza (*Burm.*); Straits of Magellan (*Darwin*); Falklands (*Abbott*); Chili (*Philippi & Landb*).

This Duck was first obtained by Azara in Buenos Ayres; and his name for it was not very correctly latinized by Vieillot. We have specimens from the same neighbourhood, obtained by Mr. W. H. Hudson. It seems to be distributed thence all over Antarctic America. According to Burmeister it is not unfrequently seen near Mendoza, in the lagoon of Rodeo del Medio. Philippi and Landbeck state that it is common in Chili, and southwards on the western coast to the Straits of Magellan. In the last-mentioned locality Mr. Darwin also obtained specimens.

In the Falkland Islands this species is more plentiful in the interior than in the neighbourhood of civilization, and is found in large flocks in some of the freshwater streams. It lays in September, and even as early as August; and the nest, with its complement of five eggs, placed in the dry grass in some retired unfrequented valley, is very difficult to find. As a rule, the bird is very tame.

6. QUERQUEDULA ANDIUM. (Plate XXXIV.)

Dafila ——, sp.?, Scl. P. Z. S. 1860, p. 83 (Ecuador).

Querquedula andium, Scl. & Salv. Nomencl. Av. Neotr. p. 162, et P. Z. S. 1875, p. 237.

Capite undique nigro et albo frequentissime marmorato; dorso obscure cinereo, scapularibus æneo-nigris fusco circumcinctis; speculo alari æneo-nigro in secundariis dorso proximis nitidissime æneo-viridi, supra et subtus fascia pallide castanea marginato; abdomine albo cineraceo adumbrato; pectore maculis plumarum centralibus fusco-nigris; rostro nigro, pedibus carneis: long. tota 16·0, *alæ* 9·0, *caudæ rigidiusculæ* 3·5.

Hab. High Ecuador, between Riobamba and Mocha (*Fraser*); Sierra Nevada of Merida (*Goering*).

Obs. Similis *Q. oxypteræ* et *Q. flavirostri*, sed notæo obscuriore, rostro nigro, et speculo alari æneo neque viridi distinguenda.

Mr. Fraser obtained a single specimen of this Duck on the high plateau of Riobamba in 1859; but Sclater did not succeed in making out the species. Subsequently Salvin selected two examples of the same bird from a collection sent to this country from Quito; and we were thus enabled to describe it for the first time in our 'Nomenclator.'

Last year we had again the pleasure of recognizing an example of this species in Mr. Goering's last collection from the Sierra Nevada of Merida, where it was obtained at an altitude of 10,000 feet.

It would appear, therefore, that this Duck replaces the two preceding species in the Andes of Ecuador and Venezuela. We have not yet seen it from Columbia; but no doubt it occurs there also.

7. QUERQUEDULA VERSICOLOR.

Pato pico de tres colores, Az. Apunt. no. 440 (Paraguay) undè

Anas versicolor, Vieill. N. D. v. p. 109 (1816), et Enc. Méth. p. 353 (1823); Schl. Mus. des P. B. *Anseres*, p. 57.

Querquedula versicolor, Cassin in Gilliss's Exp. ii. p. 203 (1856) (Chili); Scl. P. Z. S. 1860, p. 389 (Falklands); 1867, p. 335 (Chili); Abbott, Ibis, 1861, p. 161 (Falklands); Scl. & Salv. P. Z. S. 1868, p. 146 (Buenos Ayres); Ibis, 1870, p. 499 (Sandy Point), et Nomencl. p. 129; Salvin, Trans. Zool. Soc. iv. p. 499.

Anas maculirostris, Licht. Doubl. p. 84 (1823), ex Azara; Burm. J. für Orn. 1860, p. 266, et La Plata-Reise, ii. p. 516 (Mendoza); Sund. P. Z. S. 1871, p. 126 (Galapagos).

Querquedula maculirostris, Gay, Faun. Chil. p. 452, Phil. & Landb. Cat. Av. Chil. p. 42.

Pterocyanea maculirostris, Hartl. Ind. Az. p. 28.

Anas fretensis, King, P. Z. S. 1830–31, p. 15; Jard. & Selb. Ill. Orn. iv. t. 29.

Cyanopterus fretensis, Eyton, Mon. Anat. p. 131 (1838).

Anas muralis, Merr. Ersch. & Grub. Enc. sect. i. vol. xxxv. p. 42.

Supra nigra albo transfasciolata, fasciis in uropygio frequentioribus et angustioribus; pileo fumoso-nigro unicolori, capitis lateribus cum gutture lacteo-albis; abdomine albido, in pectore ochracescente induto et nigro guttato, in vertice magis albicante et nigro frequenter transfasciato; alis extus grisescenti-fuscis; speculo purpurascenti-viridi, supra et subtus albo marginato et subtus fascia altera subterminali nigra ornato; hypochondriis fasciis latis albis et nigris distincte notatis; rostro nigro, macula ad mandibulæ basin utrinque aurantiaca, pedibus corylinis: long. tota 16·5, *alæ* 7·6, *caudæ* 3·4, *tarsi* 1·3, *rostri a rictu* 1·9. Fem. *mari similis sed coloribus paulo dilutioribus et speculo alari obscuriore* [Descr. exempl. ex Chilia (*Leybold*)].

Hab. Paraguay (Azara); Buenos Ayres (*Hudson*); Mendoza (*Burm.*); Magellan Straits (*King*); Falklands (*Abbott*); Chili (*Phil. et Landb.*); Galapagos (*Sund.*).

This Duck, first described by Azara from Paraguay, is found all over Antarctic America. Mr. Hudson obtained it at Conchitas near Buenos Ayres; and according to Burmeister it occurs at Mendoza (at the foot of the Cordillera) near marshes and brooks.

In Chili Philippi and Landbeck found this species somewhat rarer than *Q. cyanoptera*. In East Falkland it is not common; but when it does occur it is usually seen in numbers. It breeds in the Falklands; for Capt. Abbott had young birds brought to him, though he never found a nest.

The supposed extension of the range of this Duck to the Galapagos is rather surprising. It rests upon the authority of Sundevall, who determined the specimen.

8. QUERQUEDULA PUNA.

Anas puna, Tsch. Faun. Per. p. 309 (Peru); Burm. Syst. Ueb. ii. p. 439.

Querquedula puna, Scl. & Salv. P. Z. S. 1869, p. 157 (Peru); Ex. Orn. p. 197, t. 99, et Nomencl. p. 129.

Supra pallide fuscescenti-cinerea, fusco variegata, plumis medialiter obscurioribus; pileo toto et linea nuchali nigris; alis extus fuscescenti-cinereis; tectricibus minoribus plumbeo tinctis et margine lato albo terminatis; secundariis in pogonio externo æneo-viridibus, albo late terminatis; subtus ochraceo-alba, pectoris plumis fusco obsolete guttatis; ventre toto et crisso nigricante minute transfasciolatis; tectricibus subalaribus et plumis axillaribus albis; rostro (in ave viva) cæruleo, culmine nigricante; pedibus cærulescenti-schistaceis: long. tota 18·0, *alæ* 8·5, *caudæ* 3, *rostri a rictu* 2·1, *tarsi* 1·3, *dig. med. cum ungue* 1·9.

Hab. High Peru (*Philippi*); Bolivia, Cochabamba (*D'Orbigny*).

Obs. Affinis *Q. versicolori* sed rostro cærulescente, pileo nigro et hypochondriorum fasciis angustis distinguenda.

The first examples of this fine Duck that attracted our notice were those in the gallery of the Jardin des Plantes at Paris, one of which is marked as having been obtained in the province of Cochabamba in Bolivia by D'Orbigny, and the other in Chili by Mr. Gay, the latter locality, however, being probably erroneous.

The specimens were not named; and we were at first inclined to regard them as belonging to an undescribed species. Subsequently, however, we received Peruvian skins of the same bird from Mr. H. Whitely, and were thus induced to make a more accurate examination of it. This led to the discovery that it is the species described by Tschudi in his 'Fauna Peruana' as *Anas puna*, from a specimen obtained by Philippi in the highlands of Peru, and transmitted to the Berlin Museum. We should add that Sclater has examined the typical example of *A. puna* in that collection, and is convinced of its identity with the present bird.

Mr. Whitely obtained two examples of this Duck on the lagoon of Tungasuca, which is situated in the Andes, south-east of Cusco, at an elevation of about 12,000 feet above the sea-level. The skins are both marked as "females;" but the male, we suppose, would hardly differ, except perhaps in possessing rather brighter plumage.

Mr. Whitely states that in the living bird the bill is light blue, with a streak of black down the centre of the upper mandible, the eye dark hazel, the legs and toes bluish slate-colour. He adds that he met with this Duck in pairs, but found it rather rare.

Querquedula puna is a very well-marked species, and can hardly be confounded with any other member of the family. It seems to be most nearly allied to *Q. versicolor*, but is readily distinguishable by its larger and uniformly coloured bill, blacker head, whiter throat, and by the finer markings above and on the flanks.

9. QUERQUEDULA TORQUATA.

Pato collar negro, Azara, Apunt. no. 441 (Paraguay) undè

Anas torquata, Vieill. N. D. v. p. 110 (1816), et Enc. Méth. p. 345 (1823); Schl. Mus. des P. B. *Anseres*, p. 61.

Querquedula torquata, Hartl. Ind. Az. p. 28 (1847); Gray, List Gall. Grall. & Ans. B. M. p. 139 (1844); Scl. P. Z. S. 1867, p. 335 (Chili); Scl. & Salv. P. Z. S. 1869, p. 635 (Buenos Ayres), et Nomencl. Av. Neotr. p. 129.

Pato ceja blanca, Azara, Apunt, no. 442 (Paraguay), undè

Anas leucophrys, Vieill. N. D. v. p. 156 (1816), et Enc. Méth. p. 354 (1823); Hartl. Ind. Az. p. 28 (♀).

A. rubidoptera, Dubois, Orn. Gal. p. 90, pl. lvii. (♂ et ♀) (1839).

A. rhodopus, Merrem, Ersch. & Grub. Enc. sect. i. vol. xxxv. p. 42.

Supra terreno-fusca, pileo et cervice in semitorquem posticum utrinque expansis, tectricibus alarum minoribus, dorso postico et cauda supra nigerrimis; scapularibus pure castaneis; alis fusco-nigris, plaga magna in secundariorum tectricibus nivea, secundariis ipsis extus viridi-æneis; subtus capitis lateribus cum gutture sordide albis fusco striolatis; pectore rosaceo induto et nigro sparse guttato; ventre et hypochondriis albis griseo tenuissime transfasciolatis, crisso medio nigro plaga utrinque nivea ornato; rostro nigro, pedibus flavissimis: long. tota 14·0, *alæ* 7·2, *caudæ* 2·7, *tarsi* 1·1, *rostri a rictu* 1·7. Fem. *fusca, superciliis et stria capitis utrinque cum gula et colli lateribus albis; subtus alba fusco transfasciata; alis et cauda nigris; secundariis extus viridi-æneis; alis macula magna alba, sicut in mare, ornatis; rostro rubro, pedibus flavis.*

Hab. Paraguay (*Azara*); Buenos Ayres (*Hudson*).

This fine Duck, for our first knowledge of which we are indebted to Azara, is rather scarce in collections, and has yet only been recognized in few localities. Azara obtained examples of both the somewhat dissimilar sexes in Paraguay, and described them under different names, as was first pointed out by us (P. Z. S. 1869, p. 635) from Mr. Hudson's specimens collected near Buenos Ayres. Philippi and Landbeck (Cat. Av. Chil. p. 94) deny the occurrence of this Duck in Chili, which Sclater had given on the authority of certain specimens in the French national collection marked "Chili, Gay." But we now know full well that Gay's localities are utterly untrustworthy.

10. QUERQUEDULA BRASILIENSIS.

Anas brasiliensis, Briss. Orn. iv. p. 360, undè

A. brasiliensis, Gm. S. N. i. p. 517 (1788) (Brazil); Max. Beitr. v. p. 936 (Brazil); Cab. in Schomb. Guiana, iii. p. 762 (Guiana); Burm. Syst. Ueb. iii. p. 437; J. für Orn. 1860, p. 267; La Plata-Reise, ii. p. 517 (Tucuman); Schl. Mus. des P. B. *Anseres*, p. 61; Reinh. Fugl. Bras. Camp. p. 21 (1870) (int. Brazil).

Querquedula brasiliensis, Scl. & Salv. P. Z. S. 1869, p. 635 (Buenos Ayres); Nomencl. p. 129; Pelz. Orn. Bras. p. 320 (1870).

"*Q. erythrorhyncha*, Spix," Eyton, Mon. Anat. p. 127 (1838); Darwin, Voy. Beagle, iii. p. 135 (1841) (Buenos Ayres and Straits of Magellan).

Ipicutiri, Az. Apunt. no. 437 (Paraguay), undè

Anas ipicutiri, Vieill. N. D. v. p. 120 (1816), et Enc. Méth. p. 354 (1823).

Querquedula ipicutiri, Hartl. Ind. Az. p. 28 (1847); Gay, Faun. Chil. p. 451 ; Ph. & Landb. Cat. Av. Chil. p. 42.

Anas paturi, Spix, Av. Bras. ii. p. 85, t. 109 (Rio S. Francisco).

A. notata, Licht. in Mus. Berol.

> *Supra fusca, pileo brunnescente; dorso postico, cauda et tectricibus alarum minoribus nigris; alis fusco-nigris, primariorum internorum et secundariorum pogoniis externis nitenti-æneo-viridibus, secundariorum internorum apicibus latis niveis, a colore æneo fascia nigra disjunctis ; subtus dilutior, in pectore rubiginoso lavata, gutture albidiore, ventris plumis fusco obsolete transfasciatis; rostro nigricante, pedibus flavis: long. tota* 15·5, *alæ* 7, *caudæ* 3·3, *tarsi* 1·2, *rostri a rictu* 1·8.

Hab. Guiana (*Schomb.*) ; Rio Brancho (*Natt.*) ; Rio San Francisco (*Spix*) ; S. E. Brazil (*Max. et Burm.*); S. Paulo and Matogrosso (*Natt.*); Bolivia (*Pearce*) ; Paraguay (*Azara*) ; Buenos Ayres (*Hudson*); Paraná and Tucuman (*Burm.*) ; Magellan Straits (*Darwin*).

This Duck seems to be very widely extended in Eastern South America from the north down to the extreme south. Schomburgk found it abundant in the marshy savannas of British Guiana; and Natterer obtained specimens on the Rio Brancho. In S.E. Brazil it is said by Prince Maximilian to be the commonest species of Duck. According to Azara, *Q. brasiliensis* is much more abundant in Paraguay than in Buenos Ayres. It is usually seen in pairs, but sometimes in flocks of twenty, associating with other Ducks. He adds that it moults in May and nests in August.

Burmeister says this species is very common on the Paraná and in all marshes and lagoons of the northern districts. It is also common at Tucuman. Mr. Darwin obtained specimens from Buenos Ayres in October, and from the Straits of Magellan in February.

Gay has inserted this species (like many others) in his list of Chilian birds; but Philippi and Landbeck (Cat. Av. Chil. p. 42) state that so far as they know it does not occur in that Republic. Gay's specimen was probably from Bolivia, whence Salvin has obtained an example.

Genus 7. DAFILA.

	Type.
Dafila, Stephens, G. Z. xii. pt. 2, p. 126 (1824)..	*D. acuta.*
Phasianurus, Wagler, Isis, 1832, p. 1235	*D. acuta.*
Pœcilonetta, Eyton, Mon. Anat. p. 32 (1838)....	*D. bahamensis.*

Three Pintails are met with in the Neotropical Region. One of these is the well-known European bird which penetrates in winter into the northern portion of the region ; the others are endemic southern species, one of which is sometimes separated as generically distinct.

1. DAFILA ACUTA.

Anas acuta, Linn. S. N. i. p. 202 (1766).

Dafila acuta, Baird, B. of N. Am. p. 776 ; Cab. J. für Orn. 1857,

p. 227 (Cuba); Scl. P. Z. S. 1857, p. 206 (Jalapa, Mexico); Scl. et Salv. Ibis, 1859, p. 231 (Guatemala), et Nomencl. Av. Neotr. p. 130; March, Pr. Ac. Phil. 1864, p. 71 (Jamaica); Lawr. Ann. Lyc. N. Y. viii. p. 13 (Panama), et ix. (1868) p. 143 (Costa Rica); Mem. Bost. Soc. N. H. ii. p. 314 (Mexico); Gundl. Repert. F.-N. i. p. 388, et J. für Orn. 1875, p. 378 (Cuba).

Hab. Cuba (*Gundlach*); Jamaica (*March*); Mexico, Jalapa (*Sallé*); Mazatlan (*Grayson*); Coahuaha (*Xantus*); Belize (*Salvin*); Guatemala, Dueñas (*Salvin*); Costa Rica (*Lawrence*); Panama (*M'Leannan*).

In Cuba the Pintail is very common on passage during the winter and autumnal months. It also occurs in Jamaica in numbers as a winter visitant. It was seen at Belize by Salvin, and is a common visitor to the Lake of Dueñas in winter. Its furthest recorded locality south appears to be the isthmus of Panama, where M'Leannan found it.

2. DAFILA SPINICAUDA.

Pato cola aguda, Az. Apunt. no. 429 (Buenos Ayres), undè

Anas spinicauda, Vieill. N. D. v. p. 135 (1816) et Enc. Méth. p. 356; Burm. La Plata-Reise, ii. p. 515; Schl. Mus. de P.-B. *Anseres*, p. 39.

Erismatura spinicauda, Hartl. Ind. Az. p. 27; Pelz. Orn. Bras. p. 321 (1870).

Dafila spinicauda, Scl. P. Z. S. 1870, p. 665, t. xxxviii. (Chili); Scl. & Salv. P. Z. S. 1868, p. 146 (Rep. Arg.), 1869, p. 157 (Tinta, Peru), et Nomencl. Av. Neotr. p. 130.

Anas oxyura, Meyen, Nov. Act. xiv. Suppl. p. 122 (1833); Merrem, Ersch. & Gruber's Enc. sect. i. vol. xxxv. p. 43; Gay, Faun. Chil. p. 449 (1848); Cassin, Gilliss's Exp. ii. p. 202 (1856); Burm. La Plata-Reise, ii. p. 515 (Mendoza); Scl. P. Z. S. 1867, p. 335 (Chili); Ph. & Landb. Cat. Av. Chil. p. 41.

Dafila urophasianus, Scl. P. Z. S. 1860, p. 389 (Falklands); Abbott, Ibis, 1861, p. 160 (Falklands).

Dafila —— sp.? Scl. & Salv. Ibis, 1868, p. 189 (Sandy Point).

Anas caudacuta, Burm. J. für Orn. 1860, p. 266 (Mendoza).

Supra fusca, plumis in centro nigricantibus fusco circumdatis; pileo læte rufescente nigro punctulato; alis extus fuscis, speculo alari amplo æneo-nigro, fascia lata cervina utrinque marginato; subtus pectore et hypochondriis cum crisso rufescentibus, plumis in centro nigris; gutture sordide albo parce nigro punctato; ventre albo in parte inferiore fusco obsolete variegato; rostro nigro, mandibula ad basin utrinque flava; pedibus plumbeis: long. tota 19·0, *alæ* 9·7, *caudæ rectr. med.* 5·5, *ext.* 3, *rostri a rictu* 2·3, *tarsi* 1·6. Fem. *mari similis.*

Hab. S. Brazil, S. Paulo (*Natt.*); Monte Video (*Sellow*); Buenos Ayres (*Azara, Hudson*); Rio Paraná et Mendoza (*Burm.*); Magellan Straits (*Cunningh.*); Falklands (*Abbott*); Chili (*Phil. et Landb.*); S. Peru, Tinta (*Whitely*).

This Pintail has a wide distribution in Antarctic America, extending from S. Brazil on one coast and the highlands of Peru on the western side down to the Magellan Straits and the Falklands.

Azara, its original discoverer, gives no particulars respecting its history, merely saying that he obtained four similar specimens in Buenos Ayres. It was procured in the adjoining State of Monte Video by Sellow, and in the Brazilian province of São Paulo by Natterer. Burmeister says this Duck is not unfrequently found in the lagoons bordering the Paraná. In his 'La Plata-Reise' he distinguishes a western race from the vicinity of Mendoza, for which he adopts Meyen's term *oxyura*. But after comparing eastern and western specimens together, we are of opinion that they belong to one species.

In Chili Philippi and Landbeck say that this is the commonest species of Duck. In the Falkland Islands it occurs rather sparingly in the freshwater ponds of the interior, where it resides throughout the year. The species is also found on the adjoining coast of Patagonia; and the specimen in Dr. Cunningham's collection left undetermined in our first list of his birds ('Ibis,' 1868, p. 189) certainly belongs to it, though not in full plumage. Mr. Whitely has sent several skins of this Duck home from the Cuzcan Andes, obtained on the lake of Tungasuca and on the river near Tinta.

3. DAFILA BAHAMENSIS.

Ilathera Duck (*Anas bahamensis*), Catesby, Carolina, vol. i. p. 93, t. 93, undè

Anas bahamensis, Linn. S. N. i. p. 199 (1766); Max. Beitr. iv. p. 925 (S.E. Brazil); Burm. Syst. Ueb. iii. p. 436; J. für Orn. 1860, p. 266, et La Plata-Reise, ii. p. 515 (Uruguay); Schl. Mus. des P.-B. *Anseres*, p. 55.

Dafila bahamensis, Hartl. Ind. Az. p. 27 (1847); Cab. in Schomburgk's Guiana, iii. p. 763; Gay, Faun. Chil. vol. i. p. 448 (1848); Cassin, Gilliss's Exp. ii. p. 203 (1856); Scl. P. Z. S. 1867, p. 335 (Chili); Ph. & Landb. Cat. Av. Chil. p. 41; Scl. & Salv. P. Z. S. 1868, p. 146 (Rep. Arg.), 1870, p. 323 (Galapagos), et Nom. Av. Neotr. p. 130; Pelz. Orn. Bras. p. 320 (1870); Salvin, Trans. Zool. Soc. iv. p. 499.

Pœcilonetta bahamensis, Eyton, Mon. Anat. p. 116 (1838); Sclater, P. Z. S. 1860, p. 389 (Falklands); Darwin, Voy. Beagle, iii. p. 135 (Galapagos Islands); Abbott, Ibis, 1861, p. 160 (Falklands).

Anas fimbriata, Merrem, Ersch. u. Grub. Enc. sect. i. vol. xxxv. p. 35 (ex Azara).

Anas urophasianus, Vig. Zool. Journ. iv. p. 357 (1829); Zool. Beechey's Voy. p. 31, t. 14.

Dafila urophasianus, Eyton, Mon. Anat. p. 112, t. 20 (1838).

Anas ilathera, Vieill. Enc. Méth. p. 152 (1823), ex Brisson, Orn. iv. p. 360.

Pato pico aplomado y roxo, Az. Apunt. no. 433 (Buenos Ayres), undè

Anas rubrirostris, Vieill. N. D. v. p. 108 (1816), et Enc. Méth. p. 353 (1823).

Rufescenti-fusca, plumis in centro nigricantibus; dorso postico nigricante; tectricibus caudæ superioribus cum cauda cervinis, rectricibus mediis dilutioribus; alis obscure schistaceo-nigris, speculo læte æneoviridi, supra et subtus fascia saturate cervina marginato et fascia altera subterminali subtus ornato; secundariorum intimorum marginibus externis cervinis, cum speculi marginibus concoloribus; subtus fuscescenti-cervina, omnino obsolete nigro guttata, gutture toto cum genis et cervice antica pure albis; rostro nigro, macula ad basin utrinque rubra; pedibus fuscis: long. tota 18·0, *alæ* 8·4, *caudæ rectr. med.* 5, *ext.* 2·8, *tarsi* 1·5, *rostri a rictu* 1·9. Fem. *mari similis.*

Hab. British Guiana (*Schomb.*); Praia de Cajutuba, near Para (*Natt.*); S.E. Brazil (*Max. et Burm.*); Buenos Ayres (*Azara et Burm.*); Patagonia (*Darwin, King*); Falklands (*Abbott*); Chili (*Ph. et Landb.*); Galapagos (*Darwin et Habel*).

Linnæus established his *Anas bahamensis* upon the Ilathera Duck of Catesby, of which that author tells us a single specimen was procured in the Bahama Islands. Catesby's figure most undoubtedly represents the present species; but if his locality is correct, the bird obtained was probably a straggler, as we have no other authentic record of its occurrence north of Guiana, where Schomburgk noticed it in flocks on the mouths of the rivers. Azara obtained two specimens of this Duck in a lagoon on the pampas of Buenos Ayres; and Darwin records it from Bahia Blanca in Northern Patagonia. Burmeister says it is spread abundantly over the whole of Brazil in ponds and marshes, and that it is nearly the commonest species of Duck there. He also observed it numerous in the La-Plata district, as well as on the Rio Uruguay. It is also common near Buenos Ayres, and is often seen exposed for sale in the market. On the Paraná and further westwards Burmeister did not observe it.

In Chili it is of uncertain occurrence, some years there being none to be seen, whilst in others it appears in plenty. Philippi and Landbeck remark that it is also found in Peru; but we have not yet seen examples from that locality. Mr. Darwin procured one specimen from a small salt-water lagoon in the Galapagos archipelago in the month of October; and Dr. Habel also obtained three individuals in that group of islands, and says it is not uncommon there. In the Falkland Islands it appears as a straggler from the mainland.

Genus 8. MARECA.

	Type.
Mareca, Stephens, G. Z. xii. pt. 2, p. 130 (1824)..	*M. penelope.*

Two Widgeons occur within the limits of the Neotropical Region, one of which is a winter migrant from the north, the other a peculiar Antarctic species of rather abnormal form.

1. MARECA AMERICANA.

Le Canard jensen, Buff. Pl. Enl. 955, undè

Anas americana, Gm. S. N. p. 526 (1788).

Mareca americana, Steph. G. Z. xii. pt. 2, p. 135; Baird, B. of N. Am. p. 783; Cab. J. für Orn. 1857, p. 227 (Cuba); Scl. &

Salv. Ibis, 1859, p. 231 (Guatemala), Nomencl. Av. Neotr. p. 130; Newton, Ibis, 1860, p. 308 (St. Thomas); Salv. Ibis, 1865, p. 193; March, Pr. Ac. Phil. 1864, p. 71 (Jamaica); Léot. Ois. Trin. p. 511 (Trinidad); Gundl. Repert. F.-N. i. p. 388, et J. für Orn. 1875, p. 378 (Cuba); Lawr. Mem. Bost. Soc. N. H. ii. p. 315 (Mexico).

Hab. Mexico (*Grayson*); Guatemala (*Salvin*); Cuba (*Gundl.*); Jamaica (*March*); St. Thomas (*Newton*); Trinidad (*Léotaud*).

The American Widgeon is said to be very common in Cuba during the annual migration from September to April. In Jamaica, too, it is to be seen in all its forms and variety of plumage. Mr. Riise procured specimens in St. Thomas; and Léotaud records it as a regular winter visitant to Trinidad. In Central America it likewise occurs in winter, having been found by Salvin in all the Guatemalan lakes during that season.

2. MARECA SIBILATRIX.

Anas sibilatrix, Poeppig, Fror. Not. no. 529 (1829), p. 10 (Chili).

Anas chiloensis, King, P. Z. S. 1830–31, p. 15; Burm. J. für Orn. 1860, p. 227, et La Plata-Reise, ii. p. 517 (Mendoza); Schl. Mus. P.-B. *Anseres*, p. 46.

Mareca chiloensis, Eyton, Mon. Anat. p. 117, t. xxi. (1838); Hartl. Ind. Az. p. 27 (1847); Gay, Faun. Chil. p. 447 (1848); Cassin, Gilliss's Exp. ii. p. 201 (1856); Gould, P. Z. S. 1859, p. 96 (Falklands); Phil. & Landb. Cat. Av. Chil. p. 41; Scl. P. Z. S. 1860, p. 389 (Falklands); 1867, pp. 335 (Chili); 1870, p. 665 Chili; Scl. & Salv. P. Z. S. 1869, p. 635 (Rep. Arg.); Ibis, 1869 p. 284 (Gregory Bay), et Nomencl. Av. Neotr. p. 130.

Pato pico pequeno, Az. Apunt. no. 432 (Buenos Ayres).

Anas parvirostris, Merr. Ersch. u. Grub. Enc. sect. i. vol. xxxv. p. 43 (1841).

> *Supra nigra, in cervice albo transfasciata, dorsi et scapularium plumis albo utrinque marginatis; pileo et genis pure albis, nucha et cervice postica viridi-purpureo lucentibus; alis fuscis, tectricibus minoribus albis; secundariis velutino-nigris ad basin albis; subtus alba, gutture et cervice antica nigricantibus, pectore superiore nigro albo transfasciolato, hypochondriis ferrugineo lavatis; rostro et pedibus nigris: long. tota* 20·0, *alæ* 10·3, *caudæ* 4·3, *tarsi* 1·4, *rostri a rictu* 1·6. Fem. *mari similis sed paulo obscurior.*

Hab. Paraguay (*Azara*); Buenos Ayres and Mendoza (*Burm.*); Falklands (*Abbott*); Chiloe (*King*); Valdivia and Central Chili (*Phil. et Landb.*).

Azara was the original describer of this fine Duck, from specimens obtained in Buenos Ayres; but Vieillot appears to have missed giving any Latin appellation to the species; and it was first provided with a scientific name by Poeppig, who gave an excellent description of it in his "Fragmenta Zoologica Itineris Chilensis," published in Froriep's 'Notizen' for July 1829. This was two years before Capt. King's term *chiloensis* (usually employed for this species) appeared; and we have consequently found it necessary to revert to the older name.

This Duck is found near Mendoza, according to Burmeister, at the foot of the Cordilleras in the lagoons and rivers. It also occurs in the lakes of the Pampas and near Buenos Ayres, where birds are often sold in the market. In Southern Chili and Valdivia, as stated by Philippi and Landbeck, it is a rare species, but is more common in the central provinces. It is one of the wildest and scarcest birds in East Falkland. Capt. Abbott never found its nest, but says that young ones were seen in a pond near Port Louis in January.

Genus 9. SPATULA.

	Type.
Spatula, Boié, Isis, 1822, p. 563	*S. clypeata.*
Rhynchaspis, Stephens, G. Z. xii. pt. 2, p. 114 (1824).	*S. clypeata.*

Two Shovellers are likewise found within Neotropical boundaries. One of them is a northern immigrant, only met with in the Antilles; the other a fine well-marked southern endemic species.

1. SPATULA CLYPEATA.

Anas clypeata, Linn. S. N. i. p. 200 (1766).

Spatula clypeata, Boie, Isis, 1822, p. 564; Baird, B. N. Am. p. 781; Scl. & Salv. Ibis, 1859, p. 231 (Guatemala), et Nom. Av. Neotr. p. 130; Scl. P. Z. S. 1862, p. 20 (Mexico); Newton, Ibis, 1860, p. 308 (St. Thomas); March, Pr. Ac. Phil. 1864, p. 71 (Jamaica); Gundl. Repert. F.-N. i. p. 389, et J. für Orn. 1875, p. 379 (Cuba); Léot. Ois. Trin. p. 518 (1866) (Trinidad); Lawr. Mem. Bost. Soc. N. H. ii. p. 314 (Mexico).

Rhynchaspis clypeata, Cab. J. für Orn. 1857, p. 228 (Cuba).

Hab. Mexico (*Boucard*, *Grayson*); Guatemala (*Salvin*); Cuba (*Gundlach*); Jamaica (*March*).

In Cuba, according to Dr. Gundlach, the Shoveller is a regular winter visitant, remaining from September to April. It also appears in Jamaica in considerable numbers. In Mexico it has been found at Guaymas and Mazatlan, as well as in S. Mexico. In Guatemala it is common in winter.

2. SPATULA PLATALEA.

Pato espatulato, Az. Apunt. no. 431 (Buenos Ayres), undè

Anas platalea, Vieill. N. D. v. p. 157 (1816), et Enc. Méth. p. 357 (1823); Burm. La Plata-Reise, ii. p. 517 (Panama and Buenos Ayres); Schl. Mus. des P.-B. *Anseres*, p. 35.

Spatula platalea, Hartl. Ind. Az. p. 27; Scl. P. Z. S. 1867, p. 335 (Chili); Scl. & Salv. P. Z. S. 1868, p. 145 (Buenos Ayres), et Nomencl. Av. Neotr. p. 130.

Rhynchaspis maculatus, Gould, MS.; Jard. & Selb. Ill. Orn. t. 147; Eyton, Mon. Anat. p. 134 (1838); Phil. & Landb. Cat. Av. Chil. p. 43.

Dafila cæsio-scapulata, Reich. Natat. tab. li. f. 180; Bibra, Denkschr. Ak. Wien, v. p. 131 (1853), et J. für Orn. 1855, p. 57 (Chili).

Rhynchaspis mexicana, Licht. Nomencl. p. 102 (descr. nulla) (?).

Supra et subtus rufescens, nigro guttata, capite et cervice undique dilutioribus et maculis minutis aspersis; uropygio nigro; dorso postico nigricante rufo undulato; alis fusco-nigris, tectricibus minoribus cæruleis, intermediis albis; secundariis extus æneis viridi nitentibus, scapularibus et secundariis dorsi proximis linea scapum occupante alba ornatis; crisso nigro; cauda fusca, rectricibus lateralibus extus albo marginatis; rostro (in pelle) obscuro; pedibus flavis: long. tota 20·5, *alæ* 8·0, *caudæ* 4·5, *tarsi* 1·4, *rostri a rictu* 2·7. Fem. *supra nigricanti-fusca, plumarum marginibus cervino-rufis; tectricibus alarum minoribus cærulescente lavatis; subtus cervino-rufescens nigro variegata et obsolete punctata; gula fere immaculata, crassitie minore.*

Hab. Buenos Ayres (*Azara & Hudson*); Paraná (*Burm.*); Chili (*Phil. & Landb.*); Falklands (*Leconte*).

According to Azara this species of Shoveller is found both in Paraguay and in Buenos Ayres. Burmeister also met with it on the Paraná and near Buenos Ayres. In Chili Philippi and Landbeck state that it is common in the central provinces, but rarer towards the south. Mr. Darwin obtaind his specimen of this Shoveller from the Rio de La Plata; whence also the one described in Jardine and Selby's 'Illustrations of Ornithology,' under the name of *Rhynchaspis maculatus*, was procured by Mr. Gould.

A female of this species, in Salvin and Godman's collection, was obtained in the Falklands by Leconte when he went to obtain living Sea-lions in 1867.

Genus 10. AIX.

	Type.
Aix, Boié, Isis, 1828, p. 329	*A. sponsa.*
Dendronessa, Sw Faun. Bor.-Am. Birds, p. 497 (1831).	*A. sponsa.*
Lampronessa, Wagler, Isis, 1832, p. 282	*A. sponsa.*

Aix is an Arctic form, the American species of which has diffused itself as far south as Cuba and Jamaica.

AIX SPONSA.

Anas sponsa, Linn. S. N. i. p. 207 (1766).

Aix sponsa, Boié, Isis, 1828, p. 329; Baird, B. of N. Am. p. 785; Gundl. J. für Orn. 1857, p. 226, Repert. F.-N. i. p. 389, et J. für Orn. 1875, p. 381 (Cuba); March, Pr. Ac. Phil. 1864, p. 71 (Jamaica); Scl. & Salv. Nom. Av. Neotr. p. 130; Lawr. Mem. Bost. Soc. ii. p. 315 (Mexico).

Hab. Mexico (*Abert*); Cuba (*Gundl.*); Jamaica (*March*).

A resident species in Cuba, frequenting shady lagoons. It nests in the island; but at what time of year Dr. Gundlach had not ascertained. In Jamaica it is very rare. Mr. Lawrence gives Col. Abert as the authority for its occurrence near Mazatlan, Mexico.

Subfamily IV. FULIGULINÆ.

The Sea-ducks are essentially arctic in their distribution. One peculiar form only (*Micropterus*) occurs on the coast of Antarctic America. A second form (*Metopiana*), though belonging to this group, seems to be only met with on fresh water.

Genus 1. METOPIANA.

Type.

Metopiana, Bp. C. R. xliii. p. 146 (1856) ...... *M. peposaca.*

Some authors have been inclined to associate this peculiar Duck with the Anatinæ; but though it is, we believe, strictly an inhabitant of fresh water, and has not the lobated hind toe of the typical Fuligulinæ, it possesses their peculiarity in the structure of the trachea, as mentioned by Burmeister (La-Plata Reise, ii. p. 518), and as recently described and figured by Garrod (P. Z. S. 1875, p. 154).

METOPIANA PEPOSACA.

Pato negrizco ala blanca, Az. Apunt. no. 430 (Paraguay and Buenos Ayres), undè

Anas peposaca, Vieill. N. D. v. p. 132 (1816), et Enc. Méth. p. 357 (1823); Hartl. Ind. Az. p. 27; Burm. La Plata-Reise, ii. p. 518, J. für Orn. 1860, p. 227 (Paraná).

Fuligula peposaca, Schl. Mus. des P.-B. *Anseres*, p. 31.

Anas metopias, Pöppig, Fror. Notiz. no. 529, p. 9 (1829).

Fuligula metopias, Gay, Faun. Chil. p. 456 (1848); Hartl. Naum. 1853, p. 217; Cassin, Gilliss's Exp. ii. p. 204, t. xxvii. (1856) Chili; Scl. P. Z. S. (1867), 335; Reich. Nat. t. cclxxxv. f. 2350; Phil. & Landb. Cat. Av. Chil. p. 43.

Metopiana peposaca, Bp. C. R. xliii. p. 146 (1856); Scl. & Salv. P. Z. S. 1868, p. 146 (Buenos Ayres), et Nom. Av. Neotr. p. 130; Scl. P. Z. S. 1870, p. 666, t. 37; Garrod, P. Z. S. 1875, p. 154.

Anas albipennis, Licht. MS.

> *Nigra, in dorso minutissime albo irrorata, cervice postica et capite superiore toto nitore purpureo indutis; secundariis albis, nigro terminatis et tectricibus nigris obtectis, speculum album efficientibus; primariis grisescenti-albis, horum quatuor externis in pogonio exteriore et omnium apicibus nigris; ventre toto griseo et albo minutissime vermiculato; crisso albo; rostro rosaceo, ad basin tumido; pedibus flavis: long. tota* 19·0, *alæ* 9·4, *caudæ* 2·8, *tarsi* 1·7, *rostri a rictu* 2·3. Fem. *supra brunnea, campterio et speculo alari albis; subtus alba, pectore et hypochondriis rufescenti-brunneis, rostro obscuro, pedibus corneis* (Descr. exempl. ex Monte Video).

Hab. Paraguay (*Azara*); Buenos Ayres (*Hudson*); Monte Video *Johnston in Mus. S.-G.*); Paraná (*Burm.*); Chili (*Phil. et Landb.*).

This beautiful Duck was first obtained by Azara, who, however, gives no details respecting it; but Burmeister tells us it is very common on the Parana; and Mr. Hudson obtained specimens near Buenos Ayres. In the central part of Chili, Philippi and Landbeck state that it is common, but rare in the southern provinces.

Judging from the description of Prince Maximilian, his *Anas erythrophthalma* (Beitr. iv. p. 929), as already suggested by Salvin (Ibis, 1874, p. 319), would appear to be very closely allied to the present species, if not identical with it. The male, as described, seems to be in immature plumage. The female agrees tolerably well with that of the present bird. Prince Maximilian obtained his two specimens of *A. erythrophthalma* in a small lake near Villa de Belmonte, in S.E. Brazil, in the month of November. No subsequent travellers seem to have recognized the species so far north.

The Rosy-billed Duck has been successfully introduced into Europe, and has bred on more than one occasion in our Gardens. In the 'Proceedings' for 1870 (*l. s. c.*) Sclater has given an account of it, and figures of both sexes from the living birds.

Genus 2. FULIGULA.

	Type.
Branta, Boié, Isis, 1822, p. 564 (nec Scop.)	*F. rufina.*
Fuligula, Stephens, G. Z. xii. pt. 2, p 187	*F. rufina.*
Callichen, Brehm, Vög. Deutschl. p. 921 (1831)	*F. rufina.*
Fulix, Sund. Vet. Ak. Handl. 1835, p. 129 (1836)	=*Fuligula.*
Nyroca, Fleming[*], Phil. of Zool. ii. p. 260 (1822)	*F. leucophthalma.*
Aythya, Boié, Isis, 1822, p. 564	*F. ferina.*
Marila, Reichenb. Nat. Syst. p. ix. (1852)	*F. ferina.*

Fuligula, as here considered, is a purely northern form, of which five species occur in winter within the Neotropical Region.

1. FULIGULA MARILA.

Anas marila, Linn. S. N. i. p. 196.

Fuligula marila, Stephens, Zool. xii. p. 198.

Fulix marila, Baird, B. N. A. p. 791; Lawrence, Mem. Bost. Soc. N. H. ii. p. 315 (Mazatlan).

Hab. Mazatlan, Mexico (*Grayson*).

Col. Grayson found the Scaup near Mazatlan in the winter months.

2. FULIGULA AFFINIS.

Fuligula affinis, Eyton, Mon. Anat. p. 157 (1838); Gosse, B. Jamaica, p. 408; Scl. & Salv. Ibis, 1859, p. 231 (Guatemala) Salv. P. Z. S. 1870, p. 219 (Veragua).

Fulix affinis, Baird, B. of N. Am. p. 791; Gundl. Repert. F.-N. i. p. 390, et J. für Orn. 1875, p. 382 (Cuba); Lawr. Ann. Lyc. N. Y. ix. (1868), p. 143 (Costa Rica); March, Pr. Ac. Phil. 1864, p. 71 (Jamaica); A. & E. Newton, Ibis, 1859, p. 366 (St. Croix); Scl. et Salv. Nom. Av. Neotr. p. 130; Lawr. Ann. Lyc. N. Y. ix. p. 210 (Yucatan), et Mem. Bost. Soc. N. H. ii. p. 315 (Mexico).

Fuligula mariloides, Cab. J. für Orn. 1857, p. 230 (Cuba).

Fuligula marila, Jard. Ann. & Mag. N. H. xx. 1847, p. 377 (Tobago); Léot. Ois. Trin. p. 522 (1866) (Trinidad).

Hab. Cuba (*Gundlach*); Jamaica (*March*); Tobago (*Kirk*);

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[*] Fleming puts *Anas ferina* first on the list; but *A. nyroca* should be considered his type, if that bird is separated from *Fuligula*.

Trinidad (*Léotaud*); Mexico (*Grayson*); Yucatan (*Schott*); Guatemala (*Salvin*); Costa Rica (*v. Frantzius*); Veragua (*Arcé*).

This Duck is rather rare in Cuba, but occurs during the autumnal and winter months on passage on the large lagoons which are not choked with high reeds. In Jamaica it is seen in considerable numbers in winter. Mr. Kirk also records it from Tobago, but says it is very rare; and Léotaud gives it as a frequent visitor to Trinidad, where it arrives in November, and departs in April.

In Guatemala Salvin found it abundant on the lakes in winter; v. Frantzius obtained it in Costa Rica; and Arcé has sent specimens from Veragua.

3. FULIGULA COLLARIS.

Anas collaris, Donov. Brit. B. vi. t. 147 (1809).

Fuligula rufitorques, Gosse, B. Jamaica, p. 408; Sclater, P. Z. S. 1862, p. 20.

Fuligula collaris, Cab. J. für Orn. 1857, p. 230 (Cuba); Salv. & Scl. Ibis, 1860, p. 277 (Guatemala).

Fuligula affinis, Scl. P. Z. S. 1859, p. 369 (*err.*).

Fulix collaris, Baird, B. of N. Am. p. 792; March, Pr. Ac. Phil. 1864, p. 72 (Jamaica); Gundl. Repert. F.-N. i. p. 390, et J. für Orn. 1875, p. 383 (Cuba); Lawr. Mem. Bost. Soc. N. H. ii. p. 315 (Mazatlan); Scl. et Salv. Nom. Av. Neotr. p. 130.

Hab. Cuba (*Gundlach*); Jamaica (*March*); E. Mexico (*Boucard*); N.W. Mexico (*Grayson et Xantus*); Guatemala (*Salvin*).

One of the commonest of the northern migrants in Cuba, where it frequents open lagoons not choked with reeds. In Jamaica it is rarely met with.

We have examined Mexican skins of this Duck collected by Boucard and De Oca; and Salvin found it on the lakes of Guatemala sparingly in winter.

4. FULIGULA AMERICANA.

Fuligula americana, Eyton, Mon. Anat. p. 155 (1838).

Aythya americana, Baird, B. of N. Am. p. 793; Gosse, B. Jamaica, p. 408, et March, Pr. Ac. Phil. 1864, p. 72 (Jamaica); Scl. et Salv. Nom. Av. Neotr. p. 130; Lawr. Mem. Bost. Soc. N. H. ii. p. 315 (Mexico).

Hab. Jamaica (*March*); valley of Mexico (*Le Strange*); Mazatlan (*Grayson*).

According to Mr. March this Pochard is not uncommon in Jamaica in winter. We know of but few instances of its occurrence on the mainland within the limits of the Neotropical region. Mr. Le Strange brought one specimen from the valley of Mexico; and Col. Grayson obtained it at Mazatlan.

5. FULIGULA VALISNERIA.

Anas valisneria, Wills. Am. Orn. viii. p. 103, t. 70 (1814).

Fuligula valisneria, Cab. J. für Orn. 1857, p. 230 (Cuba).

Aythya valisneria, Baird, B. of N. Am. p. 794; March, Pr. Ac. Phil. 1864, p. 72 (Jamaica); Salv. Ibis, 1866, p. 198 (Guatemala); Gundl. Repert. F.-N. i. p. 390, et J. für Orn. 1875, p. 382 (Cuba); Scl. et Salv. Nom. Av. Neotr. p. 130; Lawr. Mem. Bost. Soc. N. H. ii. p. 315 (Mexico).

Hab. Cuba (*Gundlach*); Jamaica (*March*); Mexico (*Grayson*); Guatemala (*Salvin*).

An occasional winter visitant in Cuba, having been observed by Dr. Gundlach in some numbers in 1839 and 1850. Mr. March says that it is sometimes found in Jamaica in company with the Pintail. Col. Grayson found it at Mazatlan.

Salvin once killed a single specimen of the Canvas-back on the Lake of Dueñas; but this is the only instance of its occurrence so far south that we are acquainted with.

Genus 3. Clangula.

	Type.
Clangula, Fleming, Phil. of Zool. ii. p. 260 (1822)	*C. glaucion**.
Glaucion, Kaup, Nat. Syst. p. 53 (1829)........	*C. glaucion.*
Bucephala, Baird, B. of N. A. p. 796 (1860)....	*C. albeola.*

Clangula is another high northern genus, of which two species have been casually met with just within the confines of the Neotropical Region.

1. Clangula glaucion.

Anas clangula et *A. glaucion*, Linn. S. N. i. p. 201.

Clangula americana, Cab. J. für Orn. 1857, p. 230 (Cuba).

Bucephala americana, Baird, B. of N. Am. p. 796; Lawr. Mem. Bost. Soc. N. H. ii. p. 315 (Mexico).

Hab. Cuba (*Lembeye*); Mexico (*Grayson*).

Dr. Gundlach tells us that Lembeye *believed* he had seen an example of the Golden-eye on a pool in Cuba, but was not able to get it. We observe that Dr. Gundlach omits this species altogether in his 'Revista,' and still more recently published notes in the 'Journal für Ornithologie' (1875). It may, however, find a place in this paper on the authority of Col. Grayson, who shot it at Mazatlan.

2. Clangula albeola.

Anas albeola, Linn. S. N. i. p. 199 (1766).

Clangula albeola, Bp. Comp. List, p. 58; Cab. J. für Orn. 1857, p. 230 (Cuba).

Bucephala albeola, Baird, B. of N. Am. p. 797; Gundl. Repert. F.-N. i. p. 390, et J. für Orn. 1875, p. 383 (Cuba).

Hab. Cuba (*Gundlach*).

A specimen of this Duck has been once observed in the market of Havana, and was procured by Gundlach.

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* Fleming, it is true, puts *Anas glacialis* first in his list; but *A. clangula* is obviously his type, and therefore we do not use Baird's term *Bucephala*.

Genus 4. ŒDEMIA.

Oedemia, Fleming, Phil. of Zool. ii. p. 260 (1822).

One species only of this northern group is recorded to have been obtained within our limits.

ŒDEMIA PERSPICILLATA.

Anas perspicillata, Linn. S. N. i. p. 201 (1766).

Œdemia perspicillata, Baird, B. of N. Am. p. 806; March, Pr. Ac. Phil. 1864, p. 72 (Jamaica); Scl. et Salv. Nom. Av. Neotrp. p. 130.

Hab. Jamaica (*Gosse*).

The Surf-scoter has been obtained in Jamaica, according to Gosse, only once. March also says it is very rare.

Genus 5. TACHYERES.

	Type.
Micropterus, Less. Traité d'Orn. p. 630 (1831) ..	*T. cinereus.*
Tachyeres, Owen, Trans. Zool. Soc. ix. p. 254 (1875).	*T. cinereus.*

This is a peculiar Antarctic type, rather questionably placed with the other Fuligulinæ *.

TACHYERES CINEREUS.

Anas cinereus, Gm. S. N. p. 506 (1788), ex Pernety (Falklands).

Micropterus cinereus, Gay, Faun. Chil. p. 457 (1848); Gould, P. Z. S. 1859, p. 96 (Falklands); Phil. & Landb. Cat. Av. Chil. p. 43; Scl. P. Z. S. 1860, p. 389 (Falklands); Scl. & Salv. Ibis, 1868, p. 189 (Sandy Point), 1870, p. 499 (Gallegos river), et Nom. Av. Neotr. p. 130; Cunningham, Ibis, 1868, p. 127.

Fuligula cinerea, Schl. Mus. des P.-B., Anseres, p. 13.

Anas brachyptera, Lath. Ind. Orn. ii. p. 834; Q. & G. Voy. Uran. p. 139, t. 39.

Micropterus brachypterus, Eyton, Mon. Anat. p. 144 (1838); Darwin, Voy. Beagle, iii. p. 136 (1841).

Oidemia patachonica, King, P. Z. S. 1830–31, p. 15.

Micropterus patachonicus, Eyton, Mon. Anat. p. 143 (1838); Scl. P. Z. S. 1861, p. 46.

Tachyeres brachypterus, Owen, Trans. Zool. Soc. ix. p. 254.

Grisescenti-brunneus; pectore, hypochondriis, scapularibus et dorso antico cinereo maculatis; gutture rufescente; stria post-oculari et fascia alari albis; abdomine toto clare albo; alis et cauda pure griseis, hujus rectricibus duabus mediis elongatis retrorsum curvatis: long. tota 27·0, *alæ* 10·8, *caudæ* 4·5, *tarsi* 2·4, *dig. med.* 4·0, *rostr.* 2·7.

Hab. Falklands (*Pernety, Abbott*); Magellan Straits (*Cunningham*); Chili, Valdivia (*Ph. et Landb.*).

This peculiar Sea-duck, originally discovered in the Falkland Islands, is found also on the west coast of S. America, according to Philippi and Landbeck, from the Straits of Magellan as far north as Valdivia in Chili.

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* *Cf.* Eyton, Mon. Anat. p. 51.

Mr. Darwin, in describing its habits, says that its wings are too small and weak to allow of flight, but that by their aid, partly swimming and partly flapping the surface of the water, it is enabled to move very quickly. He adds that he is nearly sure that it moves its wings alternately instead of, as in the case of other birds, both together. It is able to dive only a short distance. It feeds on mollusks, obtained from floating kelp and tidal rocks.

Dr. Cunningham remarks that the Loggerhead Duck is very plentiful in the eastern part of the Straits of Magellan, and that it also occurs in abundance at the Falkland Islands. He adds that the bird is exceedingly hard to kill.

In the latter islands Capt. Abbott found them in great numbers, where they breed along the coast. The nests are readily found by searching the shore just opposite where the male bird is seen swimming by himself. The old female flutters off to the water, being quite unable to fly. It lays from the end of September to the end of November, making its nest in the long grass or a bush of some kind. The usual complement of eggs is seven, as many as nine being sometimes found.

The "Flying Loggerhead" is probably the young bird of this species, though it would appear from Capt. Abbott's remarks that it breeds when still able to fly; for one flew out of a nest that he found, high up into the air. Capt. Abbott considers the flying bird distinct; but Dr. Cunningham's view seems to be the correct one, viz. that "the so-called *M. patachonicus* is only the young of *M. cinereus*, the peculiarity being that the power of flight departs from the bird as it grows old" *.

The anatomy of this Duck is fully described in Dr. Cunningham's memoir in the Society's 'Transactions.'

Subfamily V. ERISMATURINÆ.

Genus ERISMATURA.

	Type.
Oxyura, Bp. Syn. N. A. Birds, p. 390 (1828)	*E. rubida.*
Gymnura, Nuttall, Man. Ornith. ii. p. 426 (1834)	*E. rubida.*
Undina, Gould, B. of Eur. vol. v. pl. 383 (1836)	*E. mersa.*
Erismatura, Bp. Comp. List, p. 59 (1838)	*E. mersa.*
Cerconectes, Wagler, Ibis, 1832, p. 282	*E. mersa.*
Bythonessa, Gloger, Handb. d. Nat. p. 472 (1842)	*E. mersa.*

Of the three species of this quasi-cosmopolitan group one is only found in the northern part of the Neotropical region, a second is very widely spread in tropical America, and the third may be regarded as an Antarctic form.

1. ERISMATURA RUBIDA.

Anas rubida, Wils. Am. Orn. vii. p. 128, t. 81 (1814).

Erismatura rubida, Bp. Comp. List, p. 59; Baird, Bird of N. A. p. 811; Eyton. Mon. Anat. p. 171; Gundl. Repert. F.-N. i. p. 390, et J. für Orn. 1875, p. 384 (Cuba); Cab. J. für Orn. 1857, p. 230

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* See P. Z. S. 1871, p. 262, and Trans. Zool. Soc. vii. 493.

(Cuba); Scl. & Salv. Ibis, 1859, p. 231 (Guatemala) et Nom. Av. Neotr. p. 136; Scl. P. Z. S. 1859, p. 393 (Mexico); Lawr. Mem. Boston Soc. N. H. ii. p. 315 (Mexico).

Biziura rubida, Schl. Mus. des P.-B., Anseres, p. 11.

Jamaica Shoveler, Lath. Syn. iii. pt. 2, p. 513, undè

Anas jamaicensis, Gm. S. N. i. p. 529; Lath. Ind. p. 857, et Vieill. Enc. Méth. p. 127 (1823) (?).

Hab. Cuba (*Gundlach*); Mexico, Oaxaca (*Boucard*); Tepic (*Grayson*); Guatemela, Lake of Dueñas (*Salvin*).

Although certainly resident in Cuba, this is a rare species. Dr. Gundlach has found it only in the neighbourhood of Havana. Salvin met with it breeding on the Lake of Dueñas in Guatemala, where it is the only Duck resident throughout the year. He observed that it diminished in numbers during the period of the spring migration. It builds in May amongst the reeds on the margin of the lake, making a nest of dead flag with a little down. The eggs are rough in texture, and much resemble those of the European *E. mersa.*

2. ERISMATURA FERRUGINEA.

Erismatura ferruginea, Eyton, Mon. Anat. p. 170 (1838) (Chili); Gray, List Gallinæ &c. (1844), p. 146; Gray & Mitch. Gen. B. t. 169 (1844); Bridges, P. Z. S. 1843, p. 119 (Lake of Quintero, Chili); Gay, Faun. Chil. p. 458 (1848); Bibra, Denksch. Ak. Wien, v. p. 131, et J. für Orn. 1855, p. 57; Cassin, Gilliss's Exp. ii. p. 204; Phil. & Landb. Cat. Av. Chil. p. 43, et 1872, p. 549 (Rio Negro); Scl. P. Z. S. 1867, p. 335 (Chili); Scl. & Salv. P. Z. S. 1868, p. 177 (S. Peru), et Nom. Av. Neotr. p. 131; Burm. P. Z. S. 1872, p. 369; Taczanowski, P. Z. S. 1874, p. 554.

Biziura ferruginea, Schl. Mus. des P.-B., Anseres, p. 10.

Erismatura vittata, Ph. & Landb. Wiegm. Arch. 1860, p. 26 (Chili); Scl. P. Z. S. 1867, p. 335.

Erismatura cyanorhyncha, Licht. M.S. (teste Burmeister).

Supra castanea, capite et collo toto nigris; alis et cauda fuscis; subtus sordide alba, fusco irrorata, pectore et hypochondriis castaneis corpore concoloribus; rostro cæruleo, pedibus fuscis: long. tota 16·0, *alæ* 5·5, *caudæ* 3·8, *tarsi* 1·2, *rostri a rictu* 1·6. Fem. *fusca, cervino (præcipue in dorso et pileo) irregulariter transfasciata; vitta suboculari albida; subtus sordide alba, fusco (præcipue in pectore et in hypochondriis) transvittata.*

Hab. Central Peru (*Nation, Jelski*); S. Peru (*Whitely*); Chili (*Bridges, Phil. et Landb.*); Buenos Ayres (*Burm.*); Rio Negro (*Hudson*).

This *Erismatura* was first obtained in Chili by Mr. C. Crawley, and described by Eyton from his specimens in the British Museum. Philippi and Landbeck state it is common on all the lakes of the Central Provinces. They at one time described the female as of a different species (*E. vittata*), but subsequently acknowledged their error (see P. Z. S. 1868, p. 531). From Chili this species spreads northwards along the Andes as far as Central Peru, where Jelski observed it breeding on the Lake of Junin, and obtained skins and eggs. It likewise crosses the Andes into the Argentine Republic, as Burmeister met with it on the Laguna Matanza, near Buenos Ayres, and Mr. Hudson collected examples on the Rio Negro.

3. ERISMATURA DOMINICA.

Anas querquedula dominicensis, Briss. Orn. vi. p. 472 (S. Domingo), undè

Anas dominica, Linn. S. N. i. p. 201 (1766); Max. Beitr. iv. p. 938 (Bahia); Burm. Syst. Ueb. iii. p. 439 (Lakes of S.E. Brazil).

Erismatura dominica, Eyton, Mon. Anat. p. 172 (1838); Cab. J. für Orn. 1857, p. 231 (Cuba); Gundl. Repert. F.-N. i. p. 391, et J. für Orn. 1875, p. 384 (Cuba); A. & E. Newton, Ibis, 1859, p. 367 (St. Croix?); Scl. P. Z. S. 1857, p. 206 (Jalapa), et 1860, p. 254 (Orizaba); Léot. Ois. Trin. p. 525 (1866) (Trinidad); Pelz. Orn. Bras. p. 320 (1870); Reinh. Fugl. Bras. Camp. p. 20 (1870) (Lagoa dos Pitos); Lee, Ibis, 1873, p. 137 (Entrerios); Lawr. Mem. Boston Soc. N. H. ii. p. 316 (Mexico).

Biziura dominica, Schl. Mus. des P.-B. Anseres, p. 9.

Sarcelle de la Guadeloupe, Buff. Pl. Enl. 967 (♀), undè

Anas spinosa, Gm. S. N. i. p. 522 (1788) (Cayenne et Guiana); D'Orb. in La Sagra's Cuba, Aves, p. 201 (Cuba et Bolivia).

Erismatura spinosa, Gosse, Birds Jam. p. 404 (Jamaica).

"*Erismatura ortygoides*, Hill," Gosse, Birds Jam. p. 406, et Ill. pl. 113.

Ferruginea, nigro variegata et maculata; pileo nigro, vitta superciliari et altera suboculari, cum mento et genis infimis, albidis nigro punctatis; alis fuscis plaga magna secundariorum alba; cauda nigra; abdomine sordide albo rufescente irrorato; axillaribus pure albis; rostro cæruleo, pedibus nigris: long. tota 13·0, *alæ* 5·5, *caudæ* 3·8, *tarsi* 1·0, *rostri a rictu* 1·5. Fem. *fusco-nigra, dorso cervino maculato; capitis lateribus et corpore subtus cervinis, illo nigro bivittato; pectore nigro variegato.*

Hab. Cuba (*Gundlach*); S. Domingo (*Briss.*); Jamaica (*Gosse*); S. Croix (*Newton*); Trinidad (*Léotaud*); Mexico, Jalapa (*Sallé*); Tepic (*Grayson*); Veragua (*Arcé*); S.E. Brazil (*Max. et Burm.*); Mattodentro et São Paulo (*Natt.*); Uruguay (*Sellow*); Entrerios (*Lee*); Bolivia, Chiquitos (*D'Orb.*)

Obs. Ab *E. rubida* et *E. ferruginea* crassitie minore, dorso variegato et macula alari alba prorsus distinguenda.

This species of *Erismatura* is widely diffused in Tropical America, from Mexico and the Antilles down to Uruguay, inhabiting the fresh-water lakes like other members of the genus. It nests in Cuba, where Dr. Gundlach says it is common, resident, and an excellent diver. Mr. Gosse noticed this species in a broad piece of water near Redonda, in Jamaica, where as many as three may be seen at one time. They appear to be tame, but when alarmed sink rather than dive into the water. They seldom fly, and then only with a heavy laboured flight. The bird referred to by Mr. Gosse as the Quail-duck, or *E. ortygoides* of Mr. Hill, is the male of this species.

Mr. A. Newton describes what he believes to have been a flock of this Duck in St. Croix. He observed them for some time, but was unable to obtain a specimen. Léotaud tells us it is not rare in Trinidad.

In Central America this Lake-duck occurs as far north as the neighbourhood of Mazatlan, where Col. Grayson obtained it, and Jalapa, where Sallé collected specimens. Further south, down the Isthmus, it has not yet been recorded; but Salvin has recently received a skin obtained by Arcé somewhere in Veragua.

We have no recent testimony as to the occurrence of this species in Guiana and Amazonia; but in South and Central Brazil it appears to be found in all the freshwater lakes. In Entrerios it was obtained by Mr. Lee near Gualeguaychu, and in the adjoining republic of Uruguay by Sellow. In La Sagra's 'Cuba' D'Orbigny mentions that he procured examples of it in the small lakes of the province of Chiquitos in Bolivia, its furthest known range in this direction.

Subfamily VI. MERGANETTINÆ.

The Torrent-ducks form a peculiar and somewhat isolated group of the Anatidæ, restricted to the Andes of South America from Colombia to Chili.

Genus MERGANETTA.

	Type.
Merganetta, Gould, P. Z. S. 1841, p. 95	*M. chilensis.*
Raphipterus, Gay, Faun. Chil. p. 459 (1848)	*M. chilensis.*

The three species may be diagnosed from the male dress as follows:—

a. Gutture nigro	1. *armata.*
b. Gutture albo.	
Ventre nigro, medialiter fusco variegato	2. *turneri.*
Ventre albo griseo flammulato	3. *leucogenys.*

In the females the under surface is of a uniform chestnut-red.

1. MERGANETTA ARMATA.

Merganetta armata, Gould, P. Z. S. 1841, p. 95 (Chile); Des Murs, Icon. Orn. t. 48 ♀ (Chili); Gray & Mitch. Gen. of B. t. 170 (♂); Bibra, Denkschr. Akad. Wien, v. p. 132, et J. für Orn. 1855, p. 37; Cassin in Gilliss's Exp. ii. p. 204 (1856); Scl. P. Z. S. 1867, p. 340; Scl. & Salv. Ex. Orn. p. 200, et Nom. Av. Neotr. p. 131.

Biziura armata, Schl. Mus. des P.-B., Anseres, p. 12.

Raphipterus chilensis, Gay, Faun. Chil. p. 459 (1848); Phil. & Landb. Cat. Av. Chil. p. 43.

Merganetta chilensis, Des Murs, Icon. Orn. t. 5 (♂).

Supra nigra, plumis albo utrinque marginatis; capite colloque postico et laterali albis, pileo medio in strigam nuchalem pro-

ducto et linea utrinque ab oculis ad collum imum descendente nigris; alis extus cærulescenti-schistaceis; tectricibus et secundariis albo anguste terminatis, speculo alari æneo-viridi; dorso postico cinereo, uropygio fasciolis minutis albis variegato; subtus rufescenti-ochracea, lineis nigris ornata; mento, linea ad rostri basin, spatio suboculari cum gutture conjuncto et pectore superiore utraque ex parte nigerrimis; rostro flavo, pedibus rubellis: long. tota 16·5, *alæ* 7, *caudæ* 4·5, *rostri a rictu* 1·6, *tarsi* 1·9. Fem. *supra ardesiaca, dorsi plumis nigro flammulatis; collo et uropygio lineis albis nigrisque vermiculatis; subtus omnino castanea.*

Hab. Rivers of the Chilian Andes (*Bridges, Gay*).

We are indebted to the researches of Mr. Bridges among the Chilian Andes for the discovery of this curious form. He sent home specimens of the present species in 1841, which were described by Mr. Gould before this Society in November of that year. Mr. Bridges remarks that it swims and dives against the flow of the Chilian mountain-torrents with a rapidity truly astonishing.

2. MERGANETTA TURNERI.

Merganetta turneri, Scl. & Salv. P. Z. S. 1869, p. 600 (Peru), Ex. Orn. p. 199, t. 100, et Nomencl. p. 131.

Merganetta leucogenys, Scl. & Salv. (nec Tsch.) P. Z. S. 1869, p. 157.

Supra nigra, interscapulio et scapularibus rufo marginatis; capite colloque toto albis, linea rostrum cingente, pileo medio in strigam nuchalem producto et linea utrinque ad imum collum descendente nigerrimis; alis extus cærulescenti-cinereis; speculo alari æneo-viridi; tectricibus alarum et secundariis albo anguste terminatis; abdomine nigro, ventre medio fusco variegato; crisso et uropygio nigris, albo minute vermiculatis; cauda fuscescenti-cinerea unicolori; tectricibus subalaribus cinereis; rostro et pedibus obscure rubris: long. tota 16·0, *alæ* 7·5, *caudæ* 5·0, *rostri a rictu* 1·5, *tarsi* 1·8, *digiti medii cum ungue* 2·3. Fem. *supra cinerea, lateribus cervicis et uropygio albo nigroque minute vermiculatis; dorso nigro flammulato; alis albo bifasciatis; speculo alari obscure æneo-viridi; subtus fulvo-rufa unicolor: long. tota* 16·0, *alæ* 6·4, *caudæ* 4·0, *rostri a rictu* 1·35.

Hab. S. Peru; Rivers of the Cuzcan Andes (*Whitely*).

When we first received examples of this bird from Mr. H. Whitely we referred it to the species described by Tschudi as *Merganetta leucogenys*. Having, however, made a reinvestigation of the group, we convinced ourselves that Tschudi's bird is, so far as can be decided by his figure and description, inseparable from the *Merganetta columbiana* of New Granada, and that the present species must be regarded as undescribed, being equally distinct from the New-Granadan form, and from the Chilian *Merganetta armata*. From the former it differs in its larger size, and black breast and flanks, which are only relieved by some brownish marks in the middle of the belly. In the New-Granadan bird, which is well represented in Des Murs's

'Iconographie' (tab. vi.), the whole abdomen is white, sparingly striped with narrow blackish markings, and the bill is narrower and much less elevated than in this species. *Merganetta armata*, of which an excellent figure will be found in Gray and Mitchell's 'Genera of Birds,' resembles the present bird in having a black breast; but the edges of the scapularies are white instead of rufous, and the throat and fore neck are black, instead of being pure white as in its two northern allies. It would seem, therefore, that this species occupies an intermediate position as regards the differential characters of the male, just as it does in geographical range, between the two known species. As regards the female, our specimen does not appear to differ in colour from the corresponding sex of *Merganetta armata* (Des Murs, Icon. t. xlviii.).

3. MERGANETTA LEUCOGENYS.

Anas leucogenys, Tsch. Wiegm. Arch. 1843, p. 390.

Erismatura leucogenys, Tsch. Faun. Peru. p. 311, t. xxxvi.

Merganetta leucogenys, Scl. & Salv. Ex. Orn. p. 200; P. Z. S. 1869, p. 601, et 1874, p. 679, et Nomencl. p. 131; Tacz. P. Z. S. 1874, p. 554.

Merganetta columbiana, Des Murs, Rev. Zool. 1845, p. 179, et Icon. Orn. t. 6; Scl. P. Z. S. 1855, p. 164 (Bogotá).

Supra cinerea, dorsi plumis nigris rufescente utrinque marginatis; uropygio fasciolis minutis albis nigrisque variegato; capite colloque toto albis, linea circum rostrum, pileo medio in strigam nuchalem producto et linea ab oculis ad collum imum utrinque descendente nigerrimis; alis cærulescenti-schistaceis, tectricibus et secundariis albo anguste marginatis; speculo alari æneo-viridi; abdomine albo obsolete nigro striolato; rostri flavi culmine nigricante, pedibus rubellis: long. tota 12·5, *alæ* 6·0, *caudæ* 4·5, *rostri a rictu* 1·4, *tarsi* 1·5. Fem. *supra cinerea, dorso nigro flammulato; genis, cervicis lateribus et corpore toto inferiore fulvo-rufis unicoloribus: long. tota* 15·5, *alæ* 5·3, *caudæ* 4, *tarsi* 1·5, *rostri a rictu* 1·4.

Hab. Columbian Andes near Bogotá (*Goudot*); Quindiu range (*Salmon*); Ecuador (*Mus. S.-G.*); Central Peru (*Tschudi et Jelski*).

This *Merganetta* was originally discovered by Goudot, a well-known French collector, in the neighbourhood of Bogotá. There is a skin in Salvin and Godman's collection from Ecuador; and Tschudi and Jelski obtained it in Central Peru.

Subfamily VII. MERGINÆ.

Genus MERGUS.

	Type.
Mergus, Linn. S. N. i. p. 207 (1766)........	*M. cucullatus.*
Lophodytes, Reich. Av. Syst. Nat. p. ix. (1852)	*M. cucullatus.*

Besides the Hooded Merganser, which occasionally intrudes from the north, one peculiar endemic species of this group is found in the Neotropical region.

1. MERGUS CUCULLATUS.

Mergus cucullatus, Linn. S. N. i. p. 207 (1766); Cab. J. für Orn. 1857, p. 231 (Cuba); Scl. et Salv. Nom. Av. Neotr. p. 131.

Lophodytes cucullatus, Baird, B. of N. Am. p. 816; Gundl. Repert. F.-N. i. p. 391, et J. für Orn. 1875, p. 385 (Cuba); Sclater, P. Z. S. 1859, p. 369 (Jalapa).

Hab. Cuba (Gundlach); Mexico (*De Oca*).

The Hooded Merganser is of rare occurrence on passage in Cuba, and does not appear to have been noted elsewhere within our limits, except in South-eastern Mexico.

2. MERGUS OCTOSETACEUS.

Mergus octosetaceus, Vieill. N. D. xiv. p. 222 (1817), et Enc. Méth. p. 351 (1823) (Brazil).

Mergus brasilianus, Vieill. Gal. des Ois. ii. p. 209, t. 283 (1834); Eyton, Mon. Anat. p. 176 (1838); Burm. Syst. Ueb. iii. p. 441; Pelz. Orn. Bras. p. 322 (1870); Schl. Mus. des P.-B. *Anseres*, p. 6; Scl. et Salv. Nom. Av. Neotr. p. 131.

Mergus fuscus, Licht. Doubl. p. 85 (1823).

Mergus lophotes, Cuv. MS. (teste Schlegel).

Supra fusco-niger purpureo vix tinctus; plaga alarum duplici, fascia nigra divisa, alba; cervice postica æneo micante; pileo et crista elongata tenui saturate fumoso-nigris; abdomine saturate cinereo, fasciis numerosis albis in ventre signato; cervice antica et pectoris lateribus griseo et nigro confertim vermiculatis; rostro nigro, pedibus flavidis; long. tota 19·0, *alæ* 7·2, *caudæ* 4·0, *tarsi* 1·4, *rostri a rictu* 2·2.

Hab. S.E. Brazil, São Paulo (*Licht.*); Rio Ytarare (*Natt.*).

This scarce Merganser was first described by Vieillot from Delalande's specimens in the Paris Museum, and subsequently figured by the same author under another name. Lichtenstein gives São Paulo as its locality; and Natterer obtained five examples on the River Ytarare in the southern part of that province in August 1820. One of these skins, marked as the female sex, is now in the collection of Salvin and Godman, whence our description is taken.

IV. *Table of the Geographical Distribution of the Neotropical Anatidæ, with remarks thereon.*

On referring to the last column of the Table (pp. 410 & 411), it will be seen that out of the 62 species of Anatidæ included in the Neotropical list 25 are likewise found in North America. Of these 25, however, two (*Dendrocygna fulva* and *Querquedula cyanoptera*) are visitors from the south; and the Nearctic species which intrude into the Neotropical region (mostly in winter) are, so far as is at present known, 23 in number, namely

Anser hyperboreus,
—— *cærulescens*,
—— *gambeli*,
Bernicla canadensis,
Anas boschas,
—— *obscura*,
—— *strepera*,
Querquedula carolinensis,

Querquedula discors,
Dafila acuta,
Mareca americana,
Spatula clypeata,
Aix sponsa,
Fuligula marila,
—— *affinis,*
—— *collaris,*
Fuligula americana,
—— *valisneria,*
Clangula glaucion,
—— *albeola,*
Œdemia perspicillata,
Erismatura rubida,
Mergus cucullatus.

Deducting these 23, there remain 39 in the purely Neotropical list, which may be divided as follows.

In the first place, the genera *Chenalopex*, *Dendrocygna*, *Sarcidiornis*, and *Cairina* are essentially tropicopolitan. We may therefore associate the birds of these genera together as an intertropical division containing eight species, namely

Chenalopex jubata,
Dendrocygna fulva,
—— *autumnalis,*
—— *discolor,*
Dendrocygna arborea,
—— *viduata,*
Sarcidiornis melanonota,
Cairina moschata.

	Falkland Islands.	Tierra del Fuego and Patagonia.	Chili.	Argent. Republ.	Paraguay.	S. Brazil.	Bolivia.	Peru.	Amazonia.	Guiana.	Venezuela and Trinidad.	U. S. of Colombia.	Ecuador.	Galapagos Islands.	Central America and Mexico.	Antilles.	N. America.
1. Anser hyperboreus	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*
2. —— cærulescens	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*
3. —— gambeli	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
4. Bernicla canadensis	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
*5. —— melanoptera	...	...	*	...	...	...	*	*									
*6. —— magellanica	*	*															
*7. —— dispar	...	*	*														
*8. —— poliocephala	*	*	*														
*9. —— rubidiceps	*																
*10. —— antarctica	*	*															
*11. Chenalopex jubata	...	...	...	...	...	...	...	...	*	...	*						
*12. Cygnus nigricollis	*	*	*	*	...	*											
*13. —— coscoroba	*	*	*	*													
*14. Dendrocyna fulva	...	...	...	*	*	*	...	...	...	...	*	...	...	...	*	...	*
*15. —— autumnalis	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*		
*16. —— discolor	...	...	...	...	...	*	...	...	...	*	*						
*17. —— arborea	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	
*18. —— viduata	...	...	...	...	*	*	...	...	*	*	*	*	...	...	...	*	
*19. Sarcidiornis carunculata	...	...	...	...	*	*	...	...	*								
*20. Cairina moschata	...	...	...	...	*	...	...	...	*	*	*	...	...	...	*		
21. Anas boschas	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
22. —— obscura	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
*23. —— specularis	...	*	*														
*24. —— cristata	*	*	*	...	...	...	*	*									
	7	8	7	3	4	5	2	2	4	3	5	1	0	0	7	8	7

	Falkland Islands.	Tierra del Fuego and Patagonia.	Chili.	Argent. Republic.	Paraguay.	S. Brazil.	Bolivia.	Peru.	Amazonia.	Guiana.	Venezuela and Trinidad.	U. S. of Colombia.	Ecuador.	Galapagos Islands.	Central America and Mexico.	Antilles.	N. America.
	7	8	7	3	4	5	2	2	4	3	5	1	0	0	7	8	7
25. Anas strepera	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
*26. Heteronetta melanocephala	...	...	*	*													
27. Querquedula discors	...	...	...	...	...	...	...	...	...	...	*	...	...	...	*	*	*
*28. —— cyanoptera	*	*	*	*	...	...	...	...	...	...	...	*	...	...	*	...	*
29. —— carolinensis	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
*30. —— oxyptera	...	...	...	...	...	...	...	*									
*31. —— flavirostris	*	*	*	*													
*32. —— andium	...	...	...	...	...	...	...	...	...	...	...	...	*				
*33. —— versicolor	*	*	*	*	...	...	...	...	...	...	...	...	...	*			
*34. —— puna	...	...	...	...	...	...	*	*									
*35. —— torquata	...	...	...	*													
*36. —— brasiliensis	...	*	...	*	*	*	*										
37. Dafila acuta	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
*38. —— spinicauda	*	*	*	*													
*39. —— bahamensis	*	...	*	*	...	*	...	...	...	*	...	...	...	*			
40. Mareca americana	...	...	...	...	...	...	...	...	...	...	*	...	...	...	*	*	*
*41. —— sibilatrix	*	*	*	*													
42. Spatula clypeata	...	...	...	...	...	...	...	...	...	...	*	...	...	...	*	*	*
*43. —— platalea	*	...	*	*													
44. Aix sponsa	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
*45. Metopiana peposaca	...	...	*	*													
46. Fuligula marila	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	...	*
47. —— affinis	...	...	...	...	...	...	...	...	...	...	*	...	...	...	*	*	*
48. —— collaris	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
49. —— americana	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
50. —— valisneria	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
51. Clangula glaucion	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
52. —— albeola	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
53. Œdemia perspicillata	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*
*54. Tachyeres cinereus	*	*															
55. Erismatura rubida	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
*56. —— ferruginea	...	...	*	...	...	...	...	*									
*57. —— dominica	...	...	...	...	...	*	*	...	*	*	*	...	...	...	*	*	
*58. Merganetta armata	...	...	*														
*59. —— turneri	...	...	...	...	...	...	...	*									
*60. —— leucogenys	...	...	...	...	...	...	...	*	...	...	...	*	*				
61. Mergus cucullatus	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	*
*62. —— octosetaceus	...	...	...	...	...	*											
	15	15	18	14	5	9	5	7	5	5	10	3	2	2	25	25	25

Secondly, the quasi-cosmopolitan genus *Erismatura* has 2 representatives peculiar to the Neotropical region—namely, *E. ferruginea* and *E. dominicana*.

After deducting these two categories, the remaining 29 species form the Antarctic division of the Neotropical Anatidæ, and consist mostly of species belonging to genera also found in the north—*e. g.* *Bernicla* (6), *Cygnus* (2), *Anas* (2), *Querquedula* (8), *Dafila* (2), *Mareca* (1), *Spatula* (1), and *Mergus* (1). Adding these together, we have the following 23 species of Neotropical Anatidæ belonging to genera also met with in the north—namely

Bernicla melanoptera,
—— *magellanica,*
—— *dispar,*
—— *poliocephala,*
—— *rubidiceps,*
—— *antarctica,*
Cygnus nigricollis,
—— *coscoroba,*
Anas specularis,
—— *cristata,*
Querquedula cyanoptera,
—— *oxyptera,*
Querquedula flavirostris,
—— *andium,*
—— *versicolor,*
—— *puna,*
—— *torquata,*
—— *brasiliensis,*
Dafila spinicauda,
—— *bahamensis,*
Mareca sibilatrix,
Spatula platalea,
Mergus octosetaceus.

Lastly, there are 4 generic forms of Anatidæ peculiar to the Antarctic portion of the Neotropical region (*Heteronetta*, *Metopiana*, *Tachyeres*, and *Merganetta*), embracing the following six species—

Heteronetta melanocephala,
Metopiana peposaca,
Tachyeres cinereus,
Merganetta armata,
—— *turneri,*
—— *leucogenys.*

The Neotropical Anatidæ may therefore be summarized as follows:—

A. Nearctic species, mostly occurring only in winter within the Neotropical Region		23
B. Neotropical species.		
a. Species belonging to Tropicopolitan genera	8	
b. Representatives of a Cosmopolitan genus	2	
c. Peculiar species of genera also Arctic..	23	
d. Species of peculiar Antarctic genera..	6	
		——39
		62

May 2, 1876.

Robert Hudson, Esq., F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of April 1876 :—

The registered additions to the Society's Menagerie during the month of April were 95 in number. Of these, 58 were acquired by presentation, 12 by purchase, 7 by birth, and 18 were received on deposit. The number of departures during the same period, by death and removals, was 90.

The most noticeable additions during the month of April were as follows :—

1. A collection of Angolan animals brought home and presented to the Society by Lieut. V. R. Cameron, the celebrated African traveller. The collection contained the following animals :—

Name.	Scientific name.	Locality.
1 Sooty Mangabey	*Cercocebus fuliginosus*	Bought in Gaboon.
2 Guinea Baboons	*Cynocephalus babouin*	From river Kwanza.
1 Drill	*Cynocephalus leucophæus.*	Bought in Gaboon.
1 Monteiro's Galago	*Galago monteiri*	From Bailunda.
1 Servaline Cat	*Felis servalina*	From river Kwanza.
1 African Civet	*Viverra civetta*	From river Kwanza.
1 Banded Ichneumon	*Herpestes fasciatus*	From river Kwanza.
1 Senegal Touracou	*Corythaix persa*	Bought on board.
1 Angola Vulture	*Gypohierax angolensis*	From river Kwanza.
3 Broad-fronted Crocodiles.	*Crocodilus frontatus*	Bought on r. Kongo.

Lieut. Cameron also brought with him—

2. Two Chestnut-backed Colies (*Colius castanonotus*) from the river Daude, north of Loanda, presented by Henry C. Tait, Esq., C.M.Z.S.

These are the first examples of this singular form that have yet reached us alive, and are most acceptable, as showing us the various ways in which the Colies use their curiously formed feet, and the manner in which they suspend themselves head downwards.

Mr. Keuleman's drawing (Plate XXXV.) portrays these interesting birds, which are likely to do well.

Colius castanonotus was originally described by Verreaux (Rev. Zool. 1855, p. 351). Verreaux gave no locality for the species; but Hartlaub (Orn. Westafr. p. 157) states that Gaboon is its *patria*.

3. Two young Cassowaries from New Britain, presented by Mr. George Brown, C.M.Z.S., as announced in his letter already read to the Society[*], and received April 26th, by the 'Paramatta.' The other birds kindly sent by Mr. Brown have not reached us alive. We have to thank our excellent friend Dr. Bennett for his care

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[*] See P. Z. S. 1876, p. 2.

of these birds at Sydney, and the officers of the ship 'Paramatta' for their passage home.

This addition augments the number of Cassowaries now living in the collection to 8 individuals, belonging to 6 species, namely:—

Number.	Latin name.	How and when obtained.
1	*C. galeatus*	Purchased March 3, 1874.
1	*C. beccarii*	Presented by Sir J. Fergusson, Bart., F.Z.S., June 7, 1875.
2	*C. australis*	Presented by the Marquess of Normanby, January 23, 1875.
	C. australis	Presented by E. P. Ramsay, Esq., C.M.Z.S., May 28, 1875.
1	*C. uniappendiculatus*	Presented by Capt. Moresby, Aug. 25, 1874.
1	*C. picticollis*	Purchased May 27, 1874.
2	*C. bennetti*, jr.	Presented by the Rev. Geo. Brown, C.M.Z.S., April 26, 1876.

The Secretary read extracts from several letters addressed to him by Dr. George Bennett, F.Z,S., dated from Sydney in February last, referring to the proceedings of Mr. L. M. D'Albertis, C.M.Z.S., who had arrived in Sydney on the 4th of February from Yule Island, New Guinea, and was intending to stay there two months to recruit and obtain supplies, and then to return to New Guinea. Dr. Bennett enclosed a plan of the "Fly River," New Guinea, made during the cruise up it of the London Missionary Society's steamer 'Ellengowan,' in December 1875, in which M. D'Albertis, who had accompanied the expedition, had marked the different birds he had obtained or observed during the voyage. Amongst these were noted *Paradisea raggiana, Goura* sp. inc., *Buceros ruficollis, Tadorna* sp. inc., *Manucodia viridis, Epimachus magnificus,* and other rare species.

Mr. Osbert Salvin, F.R.S., exhibited and made remarks on a portion of a trunk of pine (*Pinus*) from Guatemala, perforated by a Woodpecker (*Melanerpes formicivorus*), for the purpose of storing acorns*.

Mr. G. Dawson Rowley, F.Z.S., exhibited a specimen of *Machærirhynchus nigripectus* of Schlegel, from New Guinea, being the fourth known member of this very curious genus founded by Mr. Gould. This he believed to be the first example of this species which had reached this country.

Mr. J. H. Gurney, Jun., F.Z.S., exhibited an example of the Lesser Whitefronted Goose (*Anser erythropus*), killed in Egypt, and made a few remarks on the other known Geese of that country.

Mr. A. Grote exhibited the original drawing by Col. Gordon, from which the plate of *Ovis polii* in the 'Proceedings' (1874, plate liii.) was prepared, and made the following remarks on Mr. Blanford's criticisms published in the Society's 'Proceedings' for 1875 (p. 540):—

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* *Cf.* Baird, Brewer, & Ridgway, 'North American Birds,' vol. ii. p. 569.

"Col. Gordon has asked me to lay before the meeting his original drawing of this Sheep, which has not been successfully reproduced by our artist, Mr. Smit. The male here has not the long bushy tail spoken of by Mr. Blanford; its lower outline is distinct in the sketch, though indistinct in the plate, so that the hair on the left flank may be taken to belong to the tail. This indistinctness has misled Mr. Blanford.

"Again, the black dorsal line on the female, to which Mr. Blanford objects, is far more *prononcé* in the plate than in the drawing, in which, moreover, the colouring of the figures is neither so dark nor so rufous as it has been rendered in the plate. Mr. Blanford's criticism of the coloration of the lower parts of the male and of the drawing of his horns is certainly less applicable to the original drawing than to the plate.

"As regards the apparent manes on both the male and female figures, it is admitted by Col. Gordon that in the latter this character has been exaggerated. Both Stoliczka and Severtzoff allude to short manes in their descriptions of the animal. The elongated hairs between the shoulders and behind the horns are mentioned by Stoliczka and Blanford, while Severtzoff says, 'the neck is covered by a white mane, shaded with greyish brown' (*cf.* P. Z. S. 1875, p. 513). I certainly found no trace of any thing like a mane or of a dorsal line in the specimen lately mounted in the British Museum; but this character may be variable, and as yet we have comparatively but few skins of this animal.

"It is quite true that Col. Gordon is no naturalist, and his sketch seems to have been made somewhat in a hurry; but it was made, he tells me, from the animal described by Stoliczka, who examined it while in progress, and would certainly have pointed out to the artist any flagrant inaccuracies."

Mr. George Busk, F.R.S., read a memoir on the Ancient or Quaternary Fauna of Gibraltar, as exemplified in the Mammalian remains found in the ossiferous breccia which occurs in the caves and fissures recently explored in different parts of the Rock. Mr. Busk, after a preliminary description of the geological features of the Rock and its fossiliferous caverns and fissures, treated specially of the various bones of the Bear, Cat, Horse, Rhinoceros, Stag, Ibex, and other animals, of which the remains occur there, and proceeded to refer them to the species to which they seemed to belong.

This paper will be published in full in the Society's 'Transactions.'

The following papers were read:—

1. Notes on the Anatomy of the Colies (*Colius*). By A. H. Garrod, M.A., F.Z.S., Prosector to the Society.

[Received April 25, 1876.]

About the systematic position of the Colies there has always been considerable uncertainty, partly on account of the peculiarities of their habits, and partly because their internal structure is but incompletely known. One of the examples of *Colius castanonotus*, sent to the Society by Mr. H. C. Tait, C.M.Z.S., having died just as it reached this country, I have had the opportunity of dissecting the bird, and of examining several of its special anatomical details.

Dr. Murie* has, not long since, given us an excellent *résumé* of the views entertained by different naturalists as to the systematic position of the Colies, few of which are based an any thing more than external form and habits. Burchell † placed them close to *Corythaix*; and he has been followed by many. Mr. Wallace ‡, from a study of their habits, refers them to the Parrot tribe.

In his 'Pterylography' Nitzsch § places *Colius* among his Amphibolæ, together with *Musophaga* and *Opisthocomus*, mentioning nevertheless that the genus "has a very remarkable arrangement of the feathers, and can only be compared in this respect with *Buceros*."

In his important memoir "On the Classification of Birds," Prof. Huxley ‖ places *Colius* among his Desmognathæ, in the smaller group Coccygomorphæ, the genus being the sole representative of one of its minor divisions. Prof. Huxley makes no special reference to the skull.

Dr. Murie has given us valuable information on the osteology of the bird ¶; and I am able to confirm most of his observations. There is, however, one part of the skeleton (the palate) where my results differ considerably from those of my predecessor; and these it is necessary for me to record. Dr. Murie tells us that the specimen at his disposal was somewhat injured; nevertheless, of the maxillo-palatine processes of the maxillary bones, he says that they intrude but a slight way beyond the palatal rods, and leave a wide middle space betwixt them, and that, "as respects the presence of a vomer, there is apparently a short one, tapering rather than abruptly truncate anteriorly, and not visibly cleft behind." Dr. Murie therefore removes *Colius* from among Prof. Huxley's Desmognathæ, and consequently from the Coccygomorphæ.

In the preparation of the skull of my specimen of *Colius castano-*

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* Ibis, 1872, p. 262.

† Travels in South Africa, vol. i. p. 214 (footnote).

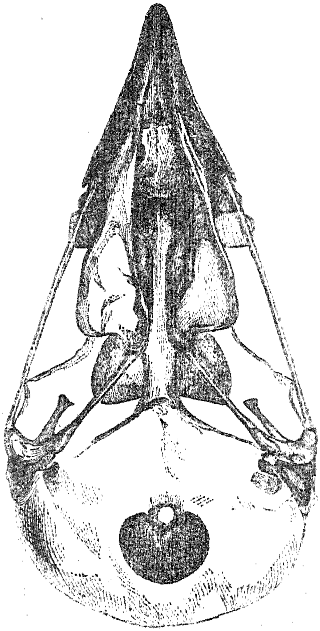
‡ Annals & Mag. of Nat. Hist. 1856, p. 213.

§ Ray Society's English Translation, edited by Mr. Sclater, p. 107.

‖ P. Z. S. 1867, p. 466.

¶ *Loc. cit.* p. 266, pl. x.

notus I have taken special care; and I find that the bird, as will be seen by the drawing which I exhibit, is without doubt desmognathous. Moreover, as the desmognathism apparently depends on the fusion of the feebly developed maxillo-palatine plates across the middle line as well as with the ossified nasal septum, it should, according to the valuable nomenclature of Prof. Parker *, be termed *direct* (of the first variety), as in the Falcons. It is not, however, possible to determine with certainty from the adult skull (from mine at least) whether the nasal septum has intervened between the maxillo-palatines, as in the Eagles, Vultures, and Owls, and as it is in the Alcedinidæ, because in them there is a demonstrable interval between the free posterior ends of these plates, the intermediate septal bond but incompletely uniting them. A slightly more extensive ossification in this region would reproduce a Parrot's palate in that of the Coly.


Palate of *Colius castanonotus*, ×2½.

Next, with reference to the vomer, the result of carefully watching the skull during maceration, and of a minute inspection of the palate in the prepared specimen, convinces me that that bone is not ossified. In thus lacking the vomer, *Colius* and *Alcedo* agree.

The sternum of my specimen closely resembles that figured by

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* Trans. Zool. Soc. vol. ix. p. 293.

Dr. Murie; the crenulation, however, of the lateral margins of the keel-bearing middle xiphoid process is not apparent. The bone resembles that of the Capitonidæ more than the sternum of any other bird (see, for comparison, Eyton's 'Osteologia Avium,' plate 8).

In the structure of its soft parts *Colius* presents several interesting features which assist in the determination of its affinities.

The skin is particularly tough, much like that of the Swifts in this respect. Only one carotid artery is present, the left. In the Musophagidæ, Cuculidæ, Coraciidæ, Galbulidæ, and Alcedinidæ we know that both a right and a left artery are always developed*; whilst in the Bucerotidæ *Toccus* possesses only the left, *Buceros* having both,—the left only being found, as in *Colius*, in the Picidæ (*i. e.* Picinæ, Ramphastinæ, and Capitoninæ), Upupidæ, Meropidæ, Trogonidæ, and Passeres. As far, therefore, as the carotid arteries are concerned, the Colies do not resemble the Musophagidæ, their supposed nearest allies. The comparison with Parrots must be reserved till further on.

Myologically, *Colius* wants the *ambiens* muscle. It is therefore Anomalogonatous†, and agrees with the passeriform and piciform birds only, differing essentially from the Musophagidæ. The *femoro-caudal* is well developed, but has no accessory head. The *semitendinosus* and its accessory head are both fairly developed. The myological formula of the bird on the system adopted by me in my paper on Classification, just referred to, is A,XY, the same as that of most passeriformes and piciformes, but differing importantly from that of the Musophagidæ (AB,XY) in the absence of B, the *accessory femoro-caudal* muscle. The *tensor fasciæ* of the thigh does not in the least cover the biceps muscle.

In the arrangement of its plantar tendons *Colius*, although so peculiar and uncertain in the manner in which it employs its toes, exactly resembles the feeble-footed Alcedinidæ, and hardly differs from the Coraciidæ, Meropidæ, Bucerotidæ, and Caprimulgidæ. In *Musophaga* the distribution of the tendons is on quite another principle, as it is in the Psittaci‡.

The intestines of *Colius* are voluminous and short, being only 9 inches in length. I could find no trace of intestinal cæca. Nitzsch has shown that the oil-gland is tufted, and that there are ten rectrices.

In my paper on the classification of birds I proposed to distribute the Anomalogonatæ into two groups, according to whether the cæca are present and at the same time the oil-gland is nude, or the cæca are absent and the oil-gland is tufted, arranging them in the following manner:—

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* P. Z. S. 1873, p. 464.

† P. Z. S. 1874, p. 116.

‡ *Vide* P. Z. S. 1875, p. 339.

PICIFORMES. With tufted oil-gland and without cæca.	PASSERIFORMES. With nude oil-gland and with cæca.
Pici.	*Passeres.*
Capitoninæ.	*Bucconidæ* (? as to cæca).
Ramphastinæ.	*Trogonidæ.*
Upupidæ.	*Meropidæ.*
(*Coliidæ*).	*Galbulidæ.*
Bucerotidæ.	*Caprimulgidæ.*
Alcedinidæ.	*Coraciidæ.*
	Momotidæ.

From what has been said above it is evident that *Colius* must be included among the Piciformes, and near those of this division with a left carotid only, a four-notched sternum, and a blended plantar-tendon arrangement. No other piciform bird, however, combines all these characters. In the Alcedinidæ the sternum and plantar arrangement correspond; in the Bucerotidæ *Toccus* agrees as to the carotid and the plantar tendons. The Picidæ (Picinæ + Capitoninæ + Ramphastinæ) have a left carotid, a two-notched sternum, but a specialized plantar-tendon distribution. Consequently the fact that the combination of characters is unique justifies us in retaining the Coliidæ in a separate family, related on the one hand to the Picidæ, and on the other to the Alcedinidæ and Bucerotidæ.

Something must be said with reference to the probability of *Colius* having psittacine affinities. It is an interesting fact that in those species of the genus *Cacatua* (*galerita, leadbeateri, moluccensis,* &c.) in which the oil-gland is not lost, the resemblances (only accidental I assume) to the genus *Colius* are peculiarly numerous. In these *Cacatuæ* there is a left carotid artery only, no ambiens muscle, and a myological formula A,XY. Nevertheless I hope that in my paper on the Order Psittaci * the impression left by its perusal is that the Parrots all sprang straight away from a stock with two carotids and an ambiens muscle. Such being the case, and *Colius* most certainly not being a true Parrot, the arguments in favour of its having arisen independently from the psittacine ancestor, and of its having undergone (also independently) cacatuiform modifications during the progress of its evolution, are less easy to accept than those which suppose it to have sprung, as I have above assumed, from the less specialized stock whence has been derived all the Anomalogonatæ. The form of the sternum and the distribution of the plantar tendons are in favour of this view of the question.

It may be mentioned that the syrinx of *Colius* (which has been figured by Johannes Müller † in a closely allied species) is most nearly related to that of *Ceryle* among the Kingfishers.

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* P. Z. S. 1874, p. 586.

† Ueber die bisher unbekannten typischen Verschiedenheiten der Stimmenorgane der Passerinen, 1847, pl. v. figs. 9-12.

2. Description of a new Thrush from Taviuni, one of the Fiji Islands. By E. L. LAYARD, C.M.G., F.Z.S., H.B.M. Consul for Fiji and Tonga.

[Received May 2, 1876.]

I am indebted to Mr. Tempest for examples of a third species of Fijian Thrush (*Turdus*), which I propose to designate by his name, having given the appellation of *vitiensis* to the species previously discovered by him at Bua.

The present bird is most interesting, as being intermediate between *T. vitiensis* and *T. vanicorensis* in colour, and likewise as being particoloured, as is the case in the first species discovered in these islands, *Turdus bicolor* (Ibis, 1875, p. 153).

It may be described as follows:—

TURDUS TEMPESTI, sp. nov.

♂. Dark smoky-brown (almost as black as in *T. vanicorensis*) throughout, with the exception of the entire head and chest, which are drab-coloured, tinged with red, much like the colour of *T. vitiensis*, nobis. Bill and feet bright orange.

Length 8″, wing 4″ 2‴, tail 3″ 2‴, tarse 1″ 4‴, bill 1″ 2‴.

The ♀ is paler and ruddier, and the head and chest less distinctly marked. A young ♂ nestling shows the dark plumage of its father, with reddish-brown shafts to many of the feathers of the back, and the same colour on the edges and tips of the feathers of the head and wing-secondaries. Underparts confusedly marked with the same.

Mr. Tempest tells me that this species has the same metallic chattering note as the European bird, but that he never heard it "sing." It inhabits the forest at the south end of Taviuni, at Selia Levu, Vuna Point, scratching under the bushes for worms and insects, on which it feeds. Some specimens killed by him had the bill covered with mud, showing that they dibbled into the ground in search of worms.

3. Note on the Discovery of the Roebuck (*Cervus capreolus*) in Palestine. By the Rev. Canon TRISTRAM.

[Received May 2, 1876.]

In a paper read before the Society in February 1866*, I mentioned, in giving a list of the mammals of Palestine, that I had reason to believe the Roebuck was found in that country, though I could not produce a specimen. I felt satisfied that I could hardly be mistaken in the small Deer I had more than once disturbed on the southern shores of Lebanon; and Mr. Boyd Dawkins had identified teeth of the Roebuck among the remains of other still existing mammals in the bone-breccia of the Lebanon caves, viz. the Ibex, Elk, Red Deer, and Bison. All doubts on this subject are now solved by the fact of Dr. Conder, R.E., having obtained on Mount Carmel a specimen, which has been sent to Cambridge, and pronounced by Prof. Newton to be the true *Cervus capreolus*.

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* See P. Z. S. 1866, p. 86.

Dr. Conder states that this Deer inhabits the thickets on the sides of Carmel, and is also met with further south, in the wooded country round Sheikh Iskander, where it gives its name to one of the principal valleys, Wady Yahmûr. Special interest attaches to the discovery from the fact of its being known to the Arabs as Yahmûr, identical with the Hebrew (יָחְמוּךְ), translated "fallow deer" in our version, and never before identified with any ruminant known to exist in Palestine.

Palestine is by far the most south-easterly region where the Roebuck has yet been found either living or among recent remains. Pallas gives *Cervus pygargus* as the Roebuck of Northern Asia, which, though identified with our Roebuck by Giebel, is generally considered to be distinct.

May 16, 1876.

Dr. A. Günther, F.R.S., V.P., in the Chair.

Mr. Sclater exhibited a skin of a rare Pacific Parrot, *Coriphilus kuhli* *, which had been sent to him for examination by Dr. Elliott Coues, C.M.Z.S. This specimen had been obtained by Dr. T. Hale Streets, U.S. Navy, at Washington Island of the Palmyra group, as indicated in the following remarks:—

"Washington, or New York, Island, the habitat of this Parrot, is situated in latitude 4° 41′ 10½″ north, and longitude 160° 18′ 0·5″ west. It was discovered in 1798 by Captain Edmund Fanning, an American; but he did not land upon it. The United-States Exploring Expedition under the command of Captain Wilkes passed it by in 1840, and reported no anchorage. The island is an obliterated atoll, and is densely covered with vegetation, the cocoa-nut palm predominating.

"It is evident from the following untechnical description taken from 'Fanning's Voyages,' that this bird existed on Fanning Island when it was first discovered. 'Amongst the birds was one species about the size of our Robin (*Turdus migratorius*), with a breast of scarlet-coloured feathers, the under portion of the body being finished off with bright red, the neck of a golden colour, back a lively green with a yellow beak, except the very points, which were of a light dun colour, the wings and tail being both of a jet-black, and the last tipped off with white; it was a most beautiful and lovely bird, with its brilliant and richly variegated plumage. We were much chagrined, while observing these, to see a Man-of-war Hawk flying by with one in his mouth, apparently having just caught it.'

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* *Domicella kuhli*, Finsch, Papag. ii. p. 749.

"Washington and Fanning are the only islands of the group (containing besides the islands Christmas and Palmyra) in which the bird is found. Washington and Fanning are situated closely together, distant from one another 77 nautical miles in a north-westerly and south-easterly direction, and they are remote from the other islands of the group.

"To quote again from 'Fanning's Voyages:' 'As at Fanning's, so here [Washington] we could perceive no token of its being at all inhabited.'

"They are still uninhabited; but the natives of the groups south of the equator visit them occasionally to gather the cocoa-nuts and to express the oil that is in them. We found such a party at Washington Island at the time of our visit. We engaged some of the Kanakas to catch the Lories alive for us. They used two pieces of bamboo, each about a yard in length. On one was perched a tame bird; and from the end of the other was suspended a running noose made of the bark of the cocoa-nut tree. The tame bird as it was carried along uttered a harsh, rasping sound; and others came out of the trees and perched alongside it on the bamboo stick, and the man noosed them by means of the other bamboo."

Mr. Sclater remarked that it was of great interest to ascertain *positively* the correct habitat of this Lory. Dr. Finsch, relying upon Bourjot's assertions, had indicated Fanning Island as its most probable *patria*, but was not without much doubt on the subject.

Dr. Günther read an extract from a letter received from Commander W. E. Cookson, R.N., of H.M.S. 'Peterel,' dated Coquimbo, March 9, 1876. Commander Cookson stated that two of the large Land-Tortoises procured from the Galapagos Islands in June 1875 were then on board, and that he was in hopes that he should be able to land them alive in England, where he expected to arrive in the beginning of next June.

The two tortoises were male and female, and, although not of a very large size, were the largest he was able to procure, and were undoubtedly adults: the male weighed 270 lbs., and the female 117 lbs. Besides these, he had the shell, head, and feet of five others from Albemarle and Abingdon Islands.

Commander Cookson had also collected and preserved specimens of *Amblyrhynchus cristatus* from the different islands of the group which he had visited, and had preserved some of the several kinds of fishes which were caught during their stay. Commander Cookson anticipated being ninety days at sea on his homeward voyage, and was afraid there would be some difficulty in keeping the Tortoises alive, as they were great eaters; he had, however, laid in a large supply of cactus, of which they were very fond. They would also eat soaked biscuit.

Dr. Peter Comrie, Staff-Surgeon R.N., exhibited the zoological specimens which he had collected during the survey of the S.E.

coast of New Guinea by H.M.S. 'Basilisk,' and read the following remarks:—

"In introducing the specimens now exhibited, my object is to show that something, although small, was done in the way of advancing natural history during the running survey made by H.M.S. 'Basilisk' of the S.E. coast of New Guinea. The opportunities were limited, and the time was short, the vessel arriving on that coast on the 20th of February, 1874, and finally leaving on May 23rd, the portion of coast embraced being from S.E. Cape to Cape Rigny, the E. point of Astrolabe Gulf. A considerable portion of time was spent among the group of islands off East Cape; but with the exception of the large D'Entrecasteaux group, where many fine butterflies were obtained, I did not find these islands at all good collecting-ground, and it was more to the northward, in Huon Gulf, on the mainland, that the richest spoils were captured. This was especially the case with Snakes and Insects, and was partly owing to the woodcutting carried on here to supply fuel for steaming-purposes on our passage to Amboyna. When any specimen considered curious was met with by the men engaged woodcutting, it was invariably saved for the 'Doctor;' and in this way I am almost entirely indebted to the men and, in some cases, the officers of the ship for what I now show. The mammals, all marsupials, were obtained alongside from the natives, who generally brought them alive, and traded them for pieces of iron hoops, which constitute the current coin all along the coast. With the exception of a Pig and a dun-coloured Dog, no mammals other than marsupials were observed. Some of the specimens are not in the best state of preservation, owing partly to my having had to leave the cases at Singapore, there having been no room for them in the hold of H.M.S. 'Basilisk,' and also to the plague of ants brought on board with the wood, and which, unless the specimens were kept enveloped in an atmosphere of carbolic acid, very soon made short work of them.

"I have no intention on this occasion to do more than generally allude to the collection as a whole, as many of the species are new, and others, although known, have hitherto not been found in New Guinea: the details connected with geographical range, diagnosis of new species, and their description, a work of time, I must leave to abler hands. I will only give a general *résumé* of the more important novelties as kindly furnished me by Mr. Sclater and Dr. Günther:—

"The *Mammals* are 9 in number; the most notable of which are 2 *Petauri* (Flying Squirrels), which differ from their nearest congener, *Petaurus ariel*, in being of a decidedly rufous tint; but whether specifically distinct can only be ascertained when their skulls have been extracted. The *Perameles* has lately been described by Dr. Peters as collected by D'Albertis in New Guinea. Two of the Bats have hitherto not been found in New Guinea.

"The *Birds*, 13 in number, belong to 11 species, the most important addition being *Manucodia* (Bird of Paradise), a new species, and which Mr. Sclater has consented kindly to name after myself; this example was the only one either seen or procured. A rather rare Tern, found by Dr. M^cGillivray in Torres Straits, completes what is noteworthy as regards the birds; and as Mr. Sclater has a paper on the subject of my birds, it will be better left to him.

"The *Snakes* are 7 in number; among which is a new species, a large specimen of Jukes's Sea-snake, hitherto not found nearer New Guinea than Torres Straits, and a species of *Tropidonotus*, hitherto not found in New Guinea.

"The Death-adder I was about stepping on, so thoroughly was its colour approximated to the surrounding vegetation; and an officer who accompanied me shot it as it was raising its head to strike me.

"*Butterflies.* These I am unable to exhibit, as they are not yet set up; but it is expected that a considerable number of new species may result on examination.

"*Land-shells.* These, few in number, Messrs. Adams and Angas will determine; and I have only brought down this evening a unique *Helix* discovered by M^cGillivray, which I found on the leaves of a species of *Pandanus* in Huon Gulf."

Prof. P. M. Duncan, F.R.S., read the second part of his memoir on the Madreporaria dredged up during the expedition of H.M.S. 'Porcupine' in 1869–70. Dr. Duncan stated that the first part of this communication had been already published in the Society's Transactions (vol. viii. p. 303), and that the present portion related to several species which were not therein mentioned. They were all simple forms, and lived in the deep sea or in shallow water. The most important species were from the Mediterranean and Atlantic off the Spanish coast. The genera *Caryophyllia, Paracyathus, Flabellum*, and *Desmophyllum* were the best-represented.

The examination of this series of corals did not necessitate any modifications of the views expressed in the former paper regarding the peculiar form of the non-reef-building Madreporaria and the affinities of many recent species with fossils.

This paper will be published in full in the 'Transactions.'

The following papers were read:—

1. Remarks on some Indian and, more especially, Bornean Mammals. By Dr. A. Günther, V.P.Z.S., Keeper of the Zoological Department, British Museum.

[Received May 16, 1876.]

(Plates XXXVI., XXXVII.)

A collection of Mammals sent by Mr. Low to the British Museum from the mainland of Borneo, opposite to Labuan, contains several specimens affording additional information as regards the fauna of that island and the distribution of the species inhabiting it. As their examination necessarily involved a comparison with specimens and species from other localities, I have added those of my notes on the latter which appeared to me to contribute to a better knowledge of them.

MACACUS MELANOTUS.

This Ape proves to be a native of Borneo. It was first described under the name of *Papio melanotus*, by Ogilby, in our 'Proceedings' for 1839, p. 31. The typical specimen, which is half-grown and in the British Museum, was said to have been brought from Madras; but for some time past this has been considered very doubtful, as no other specimen has been found in any part of continental India. A second example, without known history, an adult male, was purchased of the Zoological Society in 1866 *. The third specimen, now received from North-western Borneo (mainland opposite Labuan), is quite young, only 12 inches long. The sides, abdomen, and legs are of a light chestnut-colour; the tips of many hairs shining golden. In older examples this chestnut-colour is limited to a portion of the hairs only, and more and more replaced by blackish brown. The middle of the head and back and upperside of the tail are black mixed with brown. The longitudinal median crest of long hairs on the head, characteristic of the species, is well indicated. Of particular interest is the tail, which in our specimen is perfect, and which in both the other examples (menagerie specimens) is mutilated. It is 3½ inches long, covered with short hairs, and extremely slender in the last two thirds of its length; so that the loss of this portion in specimens kept in captivity can easily be accounted for.

GYMNURA RAFFLESII, var. CANDIDA.

All the specimens received from Labuan, the mainland opposite to Labuan, and Sarawak differ from the typical form in being of a white colour, only a part of the longest and strongest hairs on the trunk being black. The head, legs, and tail are pure white. As no structural differences can be discovered either in the skull, or dentition, or any other part of the body, I consider it sufficient to distinguish this form as a merely local variety.

TUPAIA.

Having received two species of this genus from Borneo, I have examined the series of specimens in the British Museum, which is tolerably complete, at least as regards species. They may be divided thus:—

I. *Species with grizzled hair on the hind part of the back and tail.*

A. *Large species.*

1. TUPAIA FERRUGINEA (Raffl.).

The specimens in the British Museum are from Malacca, Pinang, Singapore, and Sumatra; according to Schlegel this species occurs also in Java and on the west coast of Borneo (Pontianak). The skull is distinguished by a large oval vacuity in the zygomatic arch.

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* "*Macacus speciosus*," spec. *a*, of the 'Revised List of Vertebrated Animals in the Gardens of the Zool. Soc.' p. 16. *Cf.* Sclater, P. Z. S. 1875, p. 418.

2. TUPAIA ELLIOTI (Waterh.).

This species has always remarkably short and rigid hair *; and the vacuity in the zygomatic arch is reduced to a small foramen. I have seen three examples of this species, viz.:—the type, from the hills west of Madras; a second, found by Capt. R. C. Beavan near Maunbhoom (Bengal Pres.); and the third, brought by Major Lloyd from the Matheran hills near Bombay, which is the westernmost limit of the genus hitherto ascertained.

3. TUPAIA BELANGERI (Wagn.).

Distinguished from the preceding by its much longer and softer fur. The foramen in the zygomatic arch is small, yet larger than in *T. ellioti*. Hitherto found in Burma, Upper Pegu, and Sikkim. The name given by Wagner is the first technical designation of this species, which in Bélanger's 'Voyage' is described and figured as "Tupaia du Pégou." Jerdon ('Mamm. of India,' p. 65) used the name *Tupaia peguana*, Lesson; however, the author of the account of the Mammalia in Bélanger's 'Voyage' was not Lesson, but Is. Geoffroy St.-Hilaire.

B. *Small species.*

4. TUPAIA JAVANICA (Horsf.)

Found in Java and in the Dutch possessions of Sumatra and Borneo. Distinct as this species is from *T. ferruginea*, young examples of the latter can hardly be externally distinguished from *T. javanica*; and one of the specimens examined and named *T. javanica* by Horsfield is clearly the young of the larger species, as is proved by its undeveloped dentition. A fully adult example from Java, also named by Horsfield, is 13 inches long, the tail taking very nearly one half. For comparison's sake with the following species, I give the measurements of the four posterior molar teeth of this example:

	Length. millim.	Width. millim.
a. Molar	2·0	2·0
b. Molar	3·0	3·0
c. Molar	2·5	3·5
d. Molar	1·5	3·0

5. TUPAIA MINOR, sp. n.

Closely allied to *T. javanica*, but conspicuously smaller and with much shorter and rather rigid hair. All the hairs of the upper parts are grizzled with grey, brownish grey, and black, a reddish brown tinge prevailing in the middle of the hinder half of the back and on the tail; extremity of the tail black. Shoulder-stripe distinct. Lower parts yellowish white, of the tail brownish yellow. With the exception of the terminal hairs, the hairs of the tail are rather short. Length of body 5 inches 4 lines, of tail 6 inches 2 lines.

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* To judge from one example, the fur is soft and much longer at a very young age.

The foramen in the zygomatic arch is a narrow elongate slit. The measurements of the four posterior molar teeth are as follows:—

	Length. millim.	Width. millim.
a. Molar	1·7	1·7
b. Molar	2·5	2·5
c. Molar	2·3	2·5
d. Molar	1·4	2·0

Several specimens of this species have been sent by Mr. Low from the mainland of Borneo, opposite Labuan.

6. Tupaia murina (Müll. & Schleg.)=*T. frenata*, Gray, Ann. & Mag. Nat. Hist. 1860, vi. p. 217.

II. *The greater part of the hairs on the hind part of the back and tail are of a uniform black, brown, or red colour.*

A. *Large species.*

7. Tupaia tana (Raffl.).

This species is subject to considerable variation of colour, unaccompanied by any structural modification of the skull or dentition. The second molar has sometimes a well-developed inner tubercle at the base of the cusp; but in other specimens showing exactly the same coloration this tubercle is absent. I therefore must confirm Schlegel's opinion that *Tupaia speciosa* of Wagner is not specifically distinct from *T. tana*. The following varieties may be distinguished:—

a. Var. tana. Tail black above, basal half of each hair rusty-brown, lower part of the tail dark brown. Sumatra; ? Borneo.

b. Var. speciosa. Tail brownish red above, bright rusty-red below. Sarawak, Pontianak.

c. Var. chrysura (Plate XXXVI.). Tail golden yellow, with a reddish tinge. Mainland of Borneo, opposite to Labuan.

8. Tupaia nicobarica, Zelebor, Novara-Reise, Säugeth. p. 17, Taf. 1 & 2.

Nicobars (a desideratum in the British-Museum collection).

B. *Small species.*

9. Tupaia splendidula (Gray).

Having extracted the skull from the typical specimen, I have convinced myself that this specimen is perfectly adult.

Paradoxurus philippensis (Temm.).

An adult example sent by Mr. Low from the mainland of Borneo, opposite Labuan, agrees in every respect with specimens collected by Dr. A. B. Meyer in Luzon.

Viverra tangalunga.

The Civet Cat inhabiting Borneo is the *Viverra tangalunga* of Gray.

Quite distinct from this species is the *Viverra megaspila* (Blyth, Journ. As. Soc. Bengal, xxxi. 1863, p. 331) from Pegu and the Malayan peninsula. It grows to nearly twice the size of *V. tangalunga*, with which it agrees only in having the black median dorsal streak continued along the tail, and not interrupted by the light rings, which are incomplete and few in number. In an adult female from Pinang (Cantor's *V. tangalunga*) the body measures three feet from the tip of the nose to the root of the tail, the tail 17 inches. The black spots on the body are large, very distinct, not ocellated, and arranged in five longitudinal series. This peculiar coloration is already sufficiently distinct in a very young individual, whose total length is only 19½ inches.

As this species has never been figured, or acknowledged by naturalists, I have thought it better to draw their attention to it by the accompanying figure (Plate XXXVII.) drawn from our specimens from Pinang.

2. Notices of some Deep-sea and Littoral Corals from the Atlantic Ocean, Caribbean, Indian, New-Zealand, Persian Gulf, and Japanese &c. Seas. By Prof. P. Martin Duncan, F.R.S., Pres. Geol. Soc.

[Received May 16, 1876.]

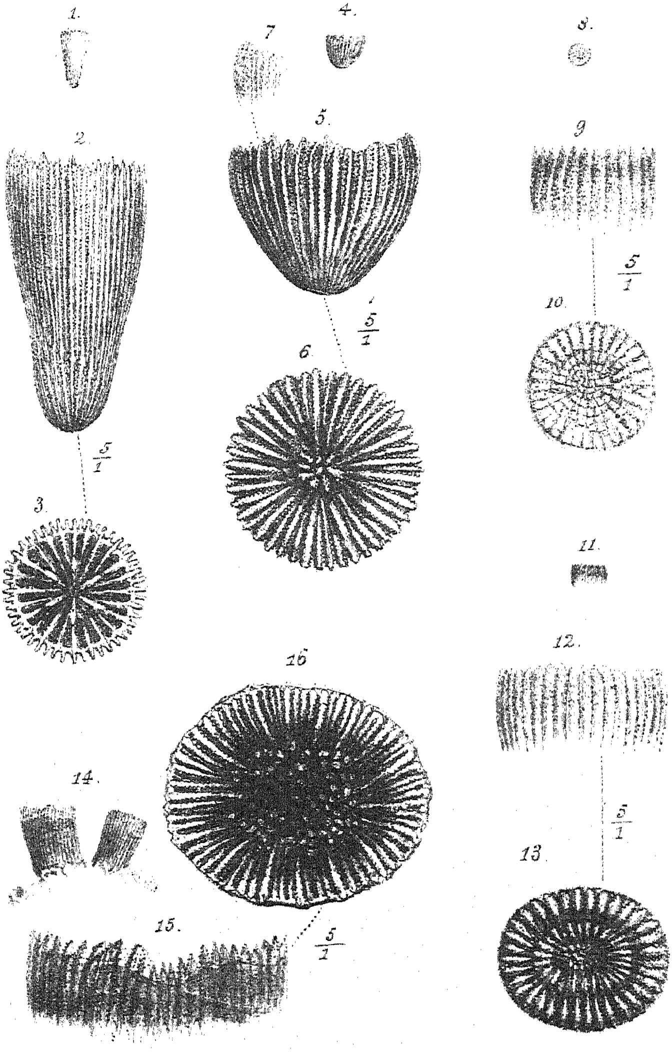
(Plates XXXVIII.–XLI.).

The corals which are described in this communication are nearly all remarkable forms. They are not the usual reef-building species, nor are they found in very deep seas; but, coming from remote districts, they present a most varied generic assemblage.

It has been necessary to establish several new genera in order to classify the species, and also to introduce into the recent coral fauna two genera, one hitherto considered to be represented only in the Cretaceous, and the other in the Miocene formation; but lately the last has been found in the Caribbean by Agassiz and Pourtalès.

Three of the species closely resemble fossil forms; and they are *Conocyathus zealandiæ*, *Deltocyathus orientalis*, and *Antillia lonsdaleia*, variety.

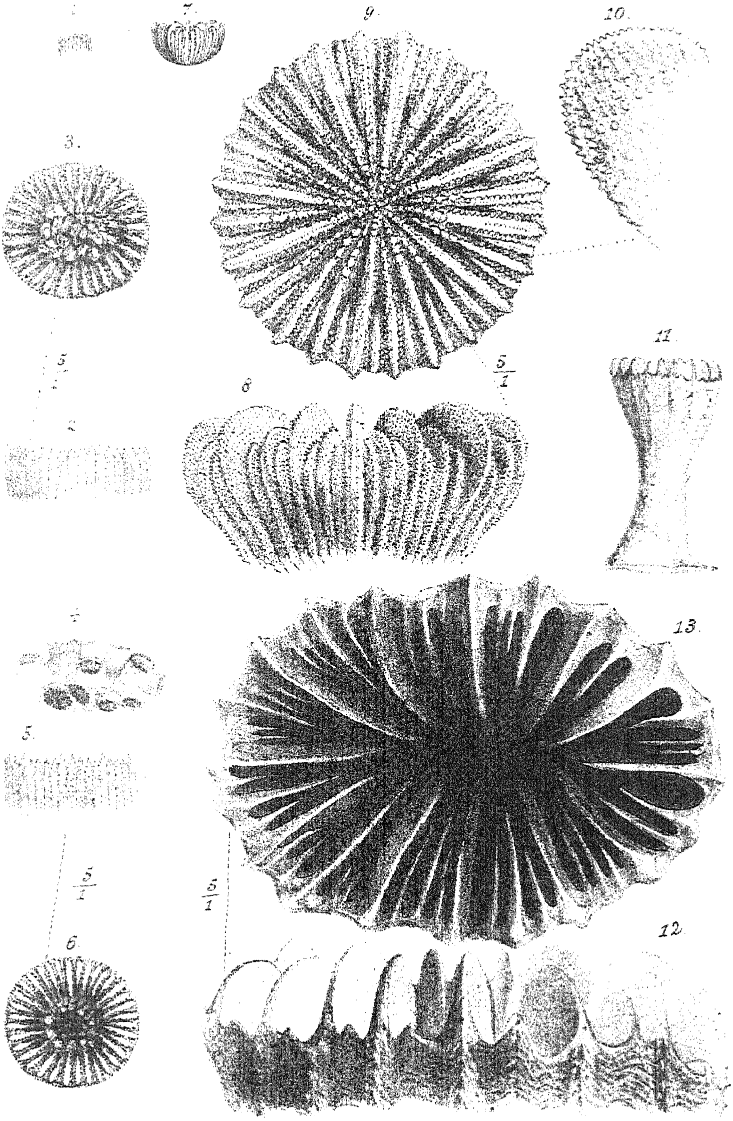
The first of these belongs to a genus which is a most marked one, and very well differentiated. It is allied to *Conocyathus sulcatus*, D'Orb., from the Miocene or Oligocene of Mayence. *Deltocyathus orientalis* is closely allied to *Deltocyathus italicus* (of the Italian Miocene); and *Antillia lonsdaleia*, var., differs very slightly from the form from the San-Domingan Miocene, described by me in the 'Quarterly Journal of the Geological Society,' vol. xx., in an essay on the fossil corals of the West Indies. This is of course a most important species; for its being found large and well developed in the Japanese seas implies that the Caribbean was once open to the west. The other evidence of this former connexion between the



From nat. on stone by J. Erxleben.

M&N Hanhart imp.

NEW CORALS.



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M & N Hanhart imp.

NEW CORALS.

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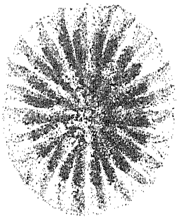

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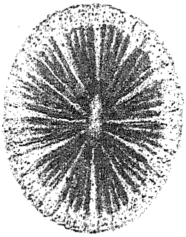

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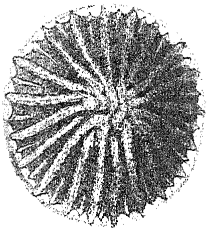

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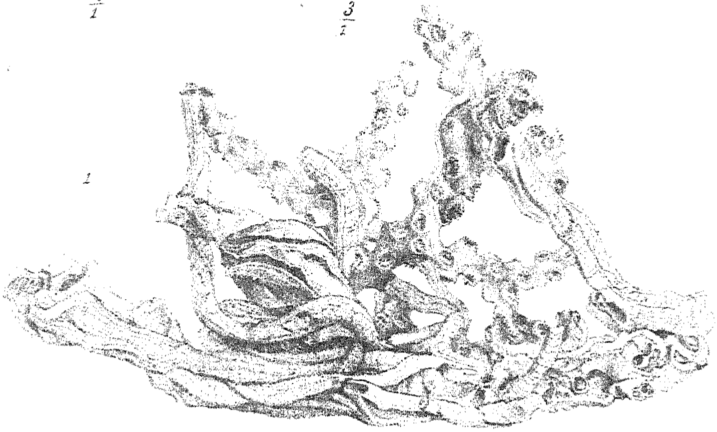

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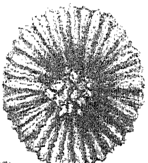

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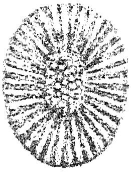

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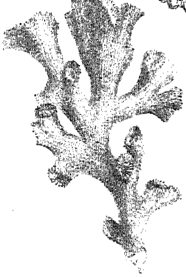

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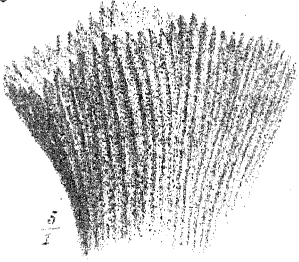

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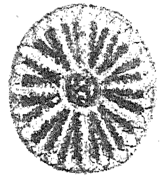

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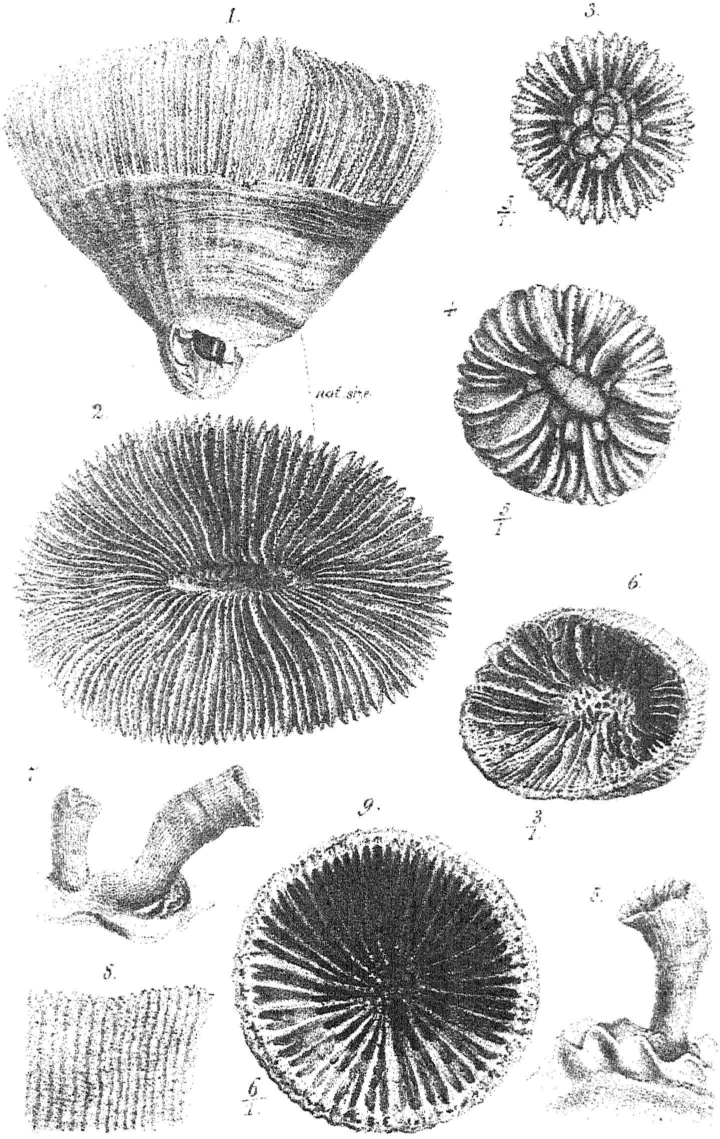
From nat. on stone by J. Erxleben.

M & N. Hanhart imp.

NEW CORALS.



From nat. on stone by J. Erxleben

M.&N. Hanhart imp.

NEW CORALS

Pacific and West-Indian coral-faunas is explained in the essay mentioned above.

Of the new genera, *Polycyathus* and *Agelecyathus* may be said to be like the Astrangiaceæ; but they have not incised septa, and there is no endotheca.

Brachytrochus is a very simple form, whose flat shape is relieved by the presence of teeth to the septa, simulating pali.

Javania is a *Desmophyllum* with a remarkable epitheca; and *Dendrocora* represents in the littoral zone the deep-sea genus *Solenosmilia*, nobis (Trans. Zool. Soc. vol. viii. p. 327).

It has been found necessary to reexamine the species *Sclerohelia hirtella* (a St. Helena coral, with a wonderful amount of calicular variation and recalling the Cretaceous *Synheliæ*), and also *Cyathohelia axillaris* of Japan.

List of new Species.

Conocyathus zelandiæ. Cook's Straits, New Zealand.
Deltocyathus orientalis. Japanese seas, 52 fathoms.
Paracyathus persicus. Persian Gulf.
—— *coronatus.* Nullipore zone in Persian Gulf.
Polycyathus atlanticus. St. Helena.
Agelecyathus helenæ. St. Helena.
—— ——, variety *minor.* St. Helena.
—— *persicus.* Persian Gulf.
Brachytrochus simplex. Gaspar Straits, 12 fathoms.
Javania insignis. Japanese seas, 48 fathoms.
Oculina cubaënsis. Caribbean sea.
Antillia lonsdaleia, Duncan, a variety. Japanese seas.
Dendrocora fissipara. West coast of Africa.
Astrangia minuta. Caribbean seas, littoral.
—— *epithecata.* Caribbean seas, littoral.
Cylicia tenella, variety. Port Natal.
Placopsammia darwini. Galapagos Islands.
Balanophyllia helenæ. St. Helena.
—— *striata.* St. Helena.

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Species reconsidered.

Family OCULINIDÆ.

Sclerohelia hirtella, Pallas.
Cyathohelia axillaris, Ellis & Solander.

Description of the Species.

Suborder SCLERODERMATA.

MADREPORARIA APOROSA.

Family TURBINOLIIDÆ.

Subfam. CARYOPHYLLIACEÆ.

Genus CONOCYATHUS, D'Orbigny.

This genus is thus described by Milne-Edwards and Jules Haime in their 'Hist. Nat. des Coral].' vol. ii. p. 25 :—

The corallum is simple, trochoid, straight, free, and without a trace of adherence. The costæ are not lamellar; the septa are exsert, being strongly spined laterally; the columella is wanting or is rudimentary; and there are well developed pali before the septa of the penultimate cycle.

The genus resembles *Turbinolia* without a columella and with pali. Its solitary species, a well-marked form, with three cycles of septa, and six large pali, was found in the Mayence Tertiary deposits, and was called by D'Orbigny *Conocyathus sulcatus*, from the grooved appearance of its outside.

Two specimens of simple corals were dredged up in Cook's Straits, New Zealand, from no very great depth, and they were evidently within this remarkable genus, differing very slightly from the fossil form.

CONOCYATHUS ZELANDIÆ, sp. n. (Plate XXXVIII. figs. 1–3.)

The corallum is conical, the calice being circular in outline; but the lower third of the corallum diminishes suddenly, there being fewer costæ there than above. The base is rounded, and is costulate, the costæ are in ridges, and have distinct intercostal spaces. There is no columella; but six large upward-projecting pali start around the axis, and are placed before each secondary septum. There are three cycles of fully developed septa, and there are three corresponding cycles of costæ; and in addition there are costæ of the fourth cycle in each of the six systems; but they correspond to rudimentary septa.

Height $\frac{3}{10}$ inch. Diameter of calice about $\frac{1}{10}$ inch.

The resemblance of this coral, at first sight, to a Turbinolian without a columella is very striking. The pali are unusually large; and the existence of the costæ, and in relation with rudimentary septa of the fourth cycle, is very remarkable.

Subfamily TROCHOCYATHACEÆ.

DELTOCYATHUS ORIENTALIS, sp. n. (Plate XXXVIII. figs. 4–7.)

The corallum is short, turbinate, widely open at the calice, and it has a circular spot to its base, which is without costæ. The columella is exceedingly small; the primary septa are very exsert; and the costæ are subequal, crowded, granular, and project from the wall. The septa are in four cycles; but the higher orders are incomplete in some systems. The pali are small and lower before the tertiaries, and prominent and tall but not broad before the secondaries. All the septa and the pali are closely granular.

Height of coral $\frac{1}{5}$ inch. Breadth of calice $\frac{1}{5}$ inch.

Locality. Japanese seas. N. lat. 34° 12′, E. long. 136° 20′, in 52 fathoms. Collected by Capt. St. John.

PARACYATHUS PERSICUS, sp. n. (Plate XXXVIII. figs. 8–10.)

The corallum is short, and the base is broader than the calice, which is shallow and open. The costæ are well developed, rounded and subequal. The septa are close and crowded, broad, not exsert, long and granular at the sides; and there are not quite three cycles. The pali are broad and short, and look like continuations of the primary and secondary septa. The columella is small and concave.

Breadth of calice $\frac{1}{12}$ inch. Height of corallum $\frac{1}{12}$ inch.

Locality. Dredged up from Persian Gulf on Nullipore.

PARACYATHUS CORONATUS, sp. n. (Plate XXXVIII. figs. 11–13.)

The base is broad, but not so wide as the calice; and the whole is short, the costæ being very distinct, prominent, unequal, and extending to the base. The calice is elliptical in outline, and the larger septa are exsert and rounded. The calice is shallow; and a circular ring of septa-like pali arises around the rather small columella. The septa are in incomplete four cycles; and there are about 20 prolongations into the inner circle. These pali are long and arched, the whole presenting the appearance of an intercalicular gemmation.

Height of corallum $\frac{2}{10}$ inch. Breadth of calice $\frac{1}{10}$ inch.

Locality. On a shell in the Persian Gulf.

There is often much difficulty in deciding whether one of the crowns of pali are really such, or only long spines attached to the septa on their inner margin near the central space.

The importance of deciding the true character of the structures is great; for whilst the septal spine may be of specific importance, the presence of the pali as independent structures is generic; for it involves the presence of other tissues—such, for instance, as an extra crown of soft tentacles. Every one who has seen many of the small sessile corals usually called *Astrangia*, *Phyllangia*, and *Ulangia* amongst the Astrangiaceæ must have felt this difficulty. In some the spinose nature of the false palus is evident; but in other species an arbitrary custom appears to have decided that such and such are not septal structures but pali.

In the Astrangiaceæ there must be evidences of endothecal structure in the form of dissepiments, although Milne-Edwards says it is "peu abondante." Moreover the septa must have their free margins more or less incised, and not plain. The origin of the corallites from a basal expansion is part of the diagnosis; but of course this fails with regard to the parent before basal expansions, or stolons have been cast forth.

If a corallite simply increases by basal expansions, or stolons, it is not necessarily one of the Astrangiaceæ; for budding can take place in species of other groups so low down and close to the base that it appears to be, and may be, essentially basal. This is seen in a specimen of *Oculina cubaënsis* from the Caribbean, when *Serpulæ* have kept the branches from rising as usual. Moreover in the *Sclerohelia* from St. Helena there are some corallites close to the base, and continuous with it, which are not distinguishable from it.

Corallites springing thus from a base more or less closely, and not having endotheca or serrate-edged septa, are not Astrangiaceæ; so that without the necessity of determining what are and what are not pali, the difficulty in classification is somewhat removed.

These observations are necessary, in order that the nature and classification of several corals which closely resemble each other may be understood, and that their separation or not from the Astrangiaceæ be comprehended.

TURBINOLIDÆ REPTANTES.

Corals rising from a prolongation of the basal structures, sometimes distant, sometimes very close. The septa are plain; and there is no endotheca.

This diagnosis forms a group amongst the Turbinolidæ like that of the Astrangiaceæ of the Astreaceæ; and this group is as it were linked on to the endothecate corals by the Oculinaceæ, which occasionally assume this basal method of growth. I believe "occasional" is a correct term, and that the force of circumstances which prevent the upward growth, and necessitate a basal one, is accompanied by trifling changes in the septal arrangement, and in that of the columella also; so that a species may present itself under two aspects. But until more is known of the soft parts, it is best to make them basal growers when they are only found in that manner.

Genus POLYCYATHUS.

There is an epitheca covering the costæ; pali are present; and the columella is usually deeply seated.

POLYCYATHUS ATLANTICUS, sp. n. (Plate XXXVIII. figs. 14–16.)

The corallites arise close to the bases of their neighbours, and grow more distinct and distant with age. Their shape is cylindro-conical, with a broad base and an elliptical calice, which is circular in outline in young species. The epitheca is very decided in young, and well seen in the old specimens. The septa are irregularly arranged; and in the largest calices there are four complete cycles and part of a fifth. The primary and secondary septa are the most distinct and exsert, being granular at the sides, but not incised on the margin. The smaller septa do not reach far from the wall. The margin of the calice, round and stout in the young corallite, is rather wavy and even angular in the largest. The costæ are subequal, granular, and covered by the epitheca. The columella is deeply seated, small, and ends in a few papillose spines. The pali resemble the spines of the columella, but are usually larger and, indeed, longer than the smaller septa before which they are placed. The pali are placed before the tertiaries and secondaries, those of the tertiaries being nearer the margin of the calice. Sometimes the pali are double or bilobed before these septa, but not before the secondaries. There is no endotheca.

Height $\frac{4}{10}$ inch. Breadth of calice $\frac{3}{10}$ inch.

On an *Ostrea* from St. Helena.

Genus AGELECYATHUS.

There is no epitheca; the costæ are well developed, especially near the calices; the septa are more or less exsert. There are pali, a columella, and no endotheca.

AGELECYATHUS HELENÆ, sp. n. (Plate XXXIX. figs. 4–6.)

The corallum incrusts; and the corallites, united by a common base, are wide apart and short. The calices are elliptical or round, open and moderately deep. The columella is small, papillose, and deeply seated; the septa are not crowded, but are stout, granular, and unequal. The primaries and some secondaries are exsert. The pali are long, thin, papillose, and are placed before the secondaries and the tertiaries. The costæ are flat, unequal, extend to the base, and are granular.

Diameter of calice $\frac{2}{10}$ inch.

Locality. On an *Ostrea* from St. Helena.

The variation of the size and shape of the pali and septa on the same corallum is interesting. In some they are both broad and sharply granular laterally.

Var. MINOR.

A smaller series of corallites, and with all the specific attributes, is on the under valve of the same *Ostrea*.

AGELECYATHUS PERSICUS, sp. n. (Plate XXXIX. figs. 1–3.)

The corallites are united by stoloniferous expansions; and some are distant, whilst others are close. The corallites are cylindrical, slightly narrower at the base, and tumid below the calice. The costæ are distinct, wide, granular, unequal, and flat. The septa are unequal, the primaries being the shortest, and those of the higher cycle much smaller: but in some calices the septa are alternately large and small. Some calices have very wide septa, largely granular at the sides; others have them thinner; and all are short. There are three cycles, or some septa of the fourth may be present. The columella is small and papillose, and deep in the rather deep fossa. The pali are small, and either thick or papillose. They are placed before the tertiaries, and sometimes before the secondaries.

The variability of the pali, and size of the septa, and the septal number is very remarkable in the same corallum.

Expanse of corallum 1 to 2 square inches. Height of corallites $\frac{1}{20}$ to $\frac{4}{10}$ inch. Breadth of calice $\frac{1}{12}$ to $\frac{1}{10}$ inch.

Locality. Dredged up out of Persian Gulf.

Subfam. TURBINOLIACEÆ.

JAVANIA, gen. nov.

The corallum is simple, tall, compressed at the calice, and adheres by a broad base. There is a complete epitheca, dense inferiorly, and pellicular superiorly. The larger septa are very exsert; and the tertiaries have costæ much broader than they are. The costæ of the primary and secondary orders project. There is no columella; and the calicular fossa is very deep.

The genus is allied to *Desmophyllum*, Ehrenberg; but the absence of exsert higher orders of septa and the dense epitheca separate it from this form.

JAVANIA INSIGNIS, sp. n. (Plate XXXIX. figs. 11–13.)

The corallum has a broad incrusting base, above which it is smaller and cylindrical, and it expands gradually, being compressed from side to side. The calice is elliptical, and the axes are on the the same plane; the septa are very unequal; and there are four cycles and part of the fifth. There are twelve nearly equal exsert septa, and twelve tertiaries which are less exsert and smaller. Between these septa there are in some parts three small and well-developed septa, and sometimes two or none. The larger septa are nearly without ornamentation and are thick; and they approach the long-axis space, deficient in columella. The epitheca is stout and plain inferiorly, but towards the calice it becomes pellicular and arranged in series of transverse festoons. These curve up to the prominent and bluntly serrate costæ, which correspond to the septa of the three front cycles. The other septa have no costæ. The calicular margin has the epitheca continued to it; and the costæ of the primaries and secondaries are exsert and wide, as are those of the tertiaries which form the costal prolongations down the wall.

Height $1\frac{1}{5}$ inch.

Locality. Japanese sea, N. lat. 34° 13′, E. long. 136° 13′, 48 fathoms. Collected by Capt. St. John.

There is some difficulty in classifying the next species, on account of the very arbitrary manner in which certain modifications of the internal parts of the septa are decided to be pali. Pali, in the strict and proper sense should arise from the internal base of the corallite, and should be placed between certain septa and the columella, or the axial space, when this last is deficient. They may adhere to the septa; but in either case the ornamentation and general arrangement of the sclerenchyma of the pali differ from those of the septa. A row of pali infers an extra row of tentacles. But the term pali is given to prominent dentations of the inner margin of septa, or to the inner margins when their dentition differs from that of the rest of the laminæ, in *Phyllangia* for instance. This is not correct: such structures may be termed papillose; but this will not permit of the corallites being classified as having pali. In the species about to be described the inner part of all the septa is more or less peculiarized by broad, widely separated, complicated granulations, or rough papillæ. The linear series of these ornaments simulate pali; but I am not disposed to admit that they are those accessory structures. Were they pali, the form would fairly come near to Gray's *Heterocyathus*, as it stood first of all—not as one of the synapticulate corals according to Milne-Edwards and Jules Haime, but a true member of the old group of Trochocyathaceæ.

As the form has no endotheca, is simple, and without pali, it comes within the Turbinolinæ, in the neighbourhood of *Desmophyllum*, *Smilotrochus*, and *Discotrochus*; but it differs from all.

Like the two well-known Japanese simple corals, the corallum has its base surrounding a shell; but in this instance the small *Ditrupa*-like annelid does not always interfere with the symmetry of the base.

Genus Brachytrochus.

The corallum is very short, free, or incrusting annelid-shells. The calice is circular, and deep centrally; there is no columella. The septa are exsert and papillose; the costæ are well developed, except on the rounded centre of the base, where they merge into a granular structure.

Brachytrochus simplex, sp. n. (Plate XXXIX. figs. 7–10.)

The calice is widely open, and the floor of the fossa is visible. The septa are in six systems, and there are four perfect cycles in each; the primaries are the largest, the most exsert, and project the most internally and externally; the secondaries are slightly smaller than the primaries, and larger than those of the third order. The fourth and fifth orders are the smallest, and rather approach the tertiaries.

All have large and wide papillæ internally; and those of the third and higher orders of septa reach furthest from the axis. The septa are rounded faintly and are thin and exsert.

The costæ are profusely granular. The inner granulations, or papillæ of the septa, radiate, as it were, from where the columella might have been.

Height $\frac{3}{20}$ inch. Breadth $\frac{4}{10}$ inch.

Locality. Gaspar Straits, 12 fathoms. From the Liverpool Museum.

Family Oculinidæ, Ed. & H.

Oculina cubaënsis, sp. n. (Plate XL. figs. 1, 2.)

The corallum incrusts dead Polyzoa and *Serpulæ*, and rises also in the form of irregular stems which branch and often coalesce. Gemmation sometimes lateral and alternate, at other times in spiral series, and without order.

The calices are not very prominent, and are moderately deep. The columella is extremely small and trabecular; the septa are alternately large and small; and the primaries and secondaries are exsert, arched, and finely spinulose at their margin. There are rarely three complete cycles. The pali are before all the septa except the last, are long, rather papillose at the surface, tall, and their inner end meets the almost rudimentary columella. The costæ are often well seen over the sides and running between the corallites; at other times they are wanting. They are often unequal, a large one being followed by a very small one. All are minutely granular, so that they feel as if spiny.

Fissiparity is rare.

Breadth of calices $\frac{1}{14}$ inch.
Locality. Caribbean Sea.
This is allied to *Oculina tenella*, Pourtalès.

SCLEROHELIA HIRTELLA, Pallas, sp. (Plate XLI. figs. 3, 4.)

This fine species has been found at St. Helena, and as yet nowhere else; and no other form comprehended by the genus has been described. On a large *Ostrea* from the coast of St. Helena, there are several specimens which would at a glance be referred to the genus *Sclerohelia*; and their examination, whilst it confirms this impression, proves the extraordinary amount of variation which the calices may present.

The specific diagnosis is as follows:—

The corallum has a thick stem and many branches, the cœnenchyma being very thick, glistening, and finely granular. The costal striæ are slightly marked. The calices are alternate and opposite on the young branches and are placed irregularly on the larger ones, being generally but slightly prominent and shallow. The columella is well developed, being made up of 7 or 8 papillæ. There are three complete cycles of septa; and some of the fourth are found in one or two systems. The septa are very unequal and very projecting at the margin. The pali are well developed, and are placed before the secondary septa. Diameter of the calices $\frac{1}{5}$ inch.

A comparison between this structural description and that which can be given of the specimens on the *Ostrea* is very instructive.

1. A large dendroid mass having three large branches, two of which coalesce after some ramifications have been given off.

Calice 1. This is on the thick branch; and its base is costulate, and the surface granular. The shape is elliptical; the septa are in six systems; and there are four perfect cycles in two systems, an incomplete fourth cycle in one, and three complete cycles in the others. The columella is composed of three oblong masses in a line; the pali are thin, rather long, and are placed before two secondaries and two tertiaries on one half, and before two tertiaries and two secondaries in the other.

In the next calice to no. 1 (2) the columellary masses have united and have assumed a dense structure, arched above. No. 3 is a calice on a small branch, the calice being rather more circular in outline; the columella has two side-papillæ; and two of the pali are wanting.

And in another calice (4) the columella is as in no. 2; but the pali are thick and broad.

On other branches of the same corallum there are some calices with four cycles of septa in four systems, and the fifth orders wanting only in the half of the other systems; and in some the columella is long and solid, or long and incomplete, or round and made up of many processes.

On the surface of the trunk there are some calices which surmount rather elongated buds, and the septal number is not over 24, and the columella consists of one twist of a band-like structure greatly resembling a styloid columella at the top.

2. A small, stunted corallum on the same shell as the last, has well-developed calices and costal markings in some places, but, as in no. 1, not everywhere. The calices are of two kinds—those with a large columella made up of several trabeculæ forming a more or less globular or circular mass, and those with elongated columellæ and well-developed pali.

3. A small trunk on the lower side of the same shell presents calices with a large columella and small pali. The costæ are very marked around some calices.

These variations in the calicular arrangement in the same corallum and in the same species are very significant, and they prove that the presence or absence of costæ, the septal number, the number and dimensions of pali, and the size and development of the columella must not be taken separately to decide specific destinctions if some of the other structures retain their special characters.

This coral is a very interesting species, as it is only found off St. Helena; but it, when worn, and when the columella is small, singularly resembles the *Synheliæ* of the chalk.

CYATHOHELIA AXILLARIS, Ellis & Solander, sp.

This common species, from the Japanese seas, is described in Milne-Edwards and Jules Haime's 'Hist. Nat. des Coral.' vol. ii. p. 110. They omit to state that the pali are situated before the primary, secondary, and tertiary septa, and that in young calices the columella is on a much lower level than the tall papillæ of the crown of pali. The thickness of the septa varies according to age.

Family ASTRÆIDÆ.

Subfam. ASTRÆINÆ.

Genus ANTILLIA, Duncan, Quart. Journ. Geol. Soc. 1864, p. 28.

ANTILLIA LONSDALEIA, Duncan, Quart. Journ. Geol. Soc. vol. xx. pl. iii. figs. 4–4*c*.

A variety of this Miocene species which I described from the Tertiaries of San Domingo is found in the Japanese seas at no very great depth. It was sent over by Capt. St. John; and on examining the two specimens I could not distinguish a specific difference between them and the fossil form. The arrangement of the lobed septa, their high cyclical number, their ornamentation and endotheca are most close in their resemblance. The general shape differs a little; and the compressed form of the calice constitutes a variety only.

The side view of the corallum is given in Plate XLI. fig. 1, and the details of the calice in Plate XLI. fig. 2.

Division CLADOCORACEÆ.

DENDROCORA, gen. nov.

The corallum is bushy, the ramifications being frequent from all parts, short and frequently forming groups in one plane. The wall is thick except near the calices; the costæ are distinct, and thicker than the septa. The columella is lax and trabecular, having pali which are placed before the tertiary septa in perfect systems. Fissiparity is common in the terminal calices, and they present short broken series. There is no epitheca. Endotheca tolerably abundant.

This genus differs from *Cladocora* in having no epitheca, in the fissiparous division, and in the thickness of the walls. It is distinguished from *Pleurocora*, to which it is more closely allied than to any other genus, in its general shape and the fissiparity of the terminal calices; and it is separated from *Goniocora* by having pali.

DENDROCORA FISSIPARA, sp. n. (Plate XL. figs. 5–7.)

The corallum is small and bushy, the branches being slender; the terminal calices are elongate, and undergo fissiparity by the division of the calice by a large septum. Ordinary calices are round, shallow, with exsert septa, very granular, in vertical lines, and slightly incised; and the columella has an open reticulated form, with processes centrally, and pali at the side. Septa in 6 systems, and usually three cycles in each, a fourth never being complete. The pali are before the third septa. The costæ are broader than the septa at the calice, and are sharply granular and very distinct. Height of coral 2 inches. Breadth of ordinary calice $\frac{1}{12}$ inch, of a series $\frac{4}{10}$ inch.

Locality. Off Bonito, West Africa. $4\frac{1}{2}$ fathoms. Liverpool Museum.

Division ASTRANGIACEÆ.

ASTRANGIA MINUTA, sp. n. (Plate XL. fig. 8.)

The base is larger than the centre; and the costæ are moderately developed. The calice is very open and shallow; the columella is well seen, and consists of papillæ which resemble those of the smaller septa. The corallite is very short; and there are three complete cycles of septa, which are short, granular, unequal, arched, and slightly excised.

Breadth of calice $\frac{1}{10}$ inch. Height of corallum $\frac{1}{30}$ inch.

Locality. On a reef-coral from the shores of San Domingo.

ASTRANGIA EPITHECATA, sp. n. (Plate XL. fig. 9.)

The corallum is short, the calices open and shorter than the base; the fossa is shallow; and the epitheca comes to the margin. The columella is small, being formed by a circle of trabeculæ joining the septal ends. Septa wide apart, unequal, usually long, and in three cycles.

Breadth of calice $\frac{3}{20}$ inch. Height of corallum $\frac{1}{20}$ inch.

Locality. On West-Indian recent reef-coral.

A group of corals associated with several little Brachiopods of the genus *Krausia* (probably a variety of *Krausia persicum*), from Port Natal, in South-eastern Africa, presents some interesting results to a careful investigation. The corallites have the aspect of the genus *Cylicia*, Dana, as they are crowded, spring from a basal expansion, have a well-marked epitheca, deep fossæ, and the septal edge concave. At first sight the whole would be associated with

Cylicia tenella, Dana, which is placed amongst the Astrangiaceæ; but the following structural peculiarities render this a matter of doubt.

1. Some corallites attain the height of $\frac{4}{10}$ inch nearly equalling 10 millimetres.

2. All the corallites do not arise from the stoloniferous base, but some spring from others between the calice and the base; but it does not appear that these are buds. They are probably the result of polypes that became fixed on to the epitheca of the original one in their mobile stage.

3. The epitheca is shown perfectly in small corallites; but the larger and even some of the smaller have distinct but small costæ, which are marked with granules, and which join the angular and very slightly exsert ends of the septa.

4. The septal arrangement is irregular. There are six primary septa, and a number of others, the majority resembling the primaries. Usually there are 20 large septa reaching into the calice; and between each pair there is often, but not invariably, a rudimentary septum. In some calices the primaries appear to be five in number; and in a bud there is one primary and a small septum on either side of it. All are granular and incised more or less.

5. The endotheca is absent, except within the calice of two specimens, where it is extending between the septa near the wall, as if commencing to occlude the floor of the calice.

6. The columella is formed of processes from the septal ends, is small, and has three or more beautiful granular ornaments on the points where the reticulations meet.

The incised nature of the larger septa along their slanting internal margin is evident. Sometimes the septa do not even reach to the calicular margin; and some appear as spines from the inner part of the calicular wall. The third cycle is rarely complete if the rudimentary septa, which project between the larger $\frac{1}{50}$ inch or a little more, are wanting, as in the diagnosis of Milne-Edwards and Jules Haime, 'Hist. Nat. des Corall.' vol. ii. p. 608; and the third cycle do not always bend towards the secondary septa. If the rudimentary septa are counted, the fourth cycle is rarely complete.

The species *Cylicia tenella* and *C. verreauxi*, Ed. & H., differ in respect of the perfection of the third and imperfection of the fourth cycle, this last never being perfect in either. There is no specific distinction between them; and therefore the last-named species had better disappear. The form under consideration I deem a variety of *Cylicia tenella*, var. *natalensis* (Plate XL. fig. 3).

MADREPORARIA PERFORATA.

Family EUPSAMMINÆ.

BALANOPHYLLIA HELENÆ, sp. n. (Plate XLI. figs. 5, 6.)

The corallite has a small base, a narrow bent cylindrical stem, and a suddenly large calicular opening.

The costæ are not exsert at the calice, are distinct to the base, slightly prominent, unequal, very numerous, perforated here and there, close together, and spinulosely granular, the grains being few and large. There is an epitheca, which reaches upwards from the base a short distance; and the wall is thin and reticulate. The calicular fossa is wide and shallow; the columella is oval and moderately large; and there are more than five cycles of septa in each of the six systems. The septa are thin, not exsert, long, and unite not far from the columella, and near the wall the larger are perforate.

Height $\frac{6}{10}$—$\frac{8}{10}$ inch. Breadth of calice $\frac{3}{10}$—$\frac{4}{10}$ inch.

Locality. St. Helena, on an *Ostrea*; probably 11 fathoms. (Sent as having come up with an anchor from a great depth.)

BALANOPHYLLIA STRIATA, sp. n. (Plate XLI. figs. 7–9.)

The corallite is tube-like, there being but slight alteration in the breadth of the cylindrical and bent form during growth; it is long, slender, bent, and fixed by a wide base. The costæ are numerous, subequal, close, faintly granular; and the synapticulæ are visible on the intercostal spaces where the costæ have been worn, but not otherwise. There is an epitheca inferiorly. The costæ do not project upwards at the calice; but those of the primary and secondary septa and sometimes of the tertiary are a little higher than the others. The wall is thin at the margin, and the reticulation is slight. The calice is circular in outline, very deep; and the columella is very small, and appears as a few scattered papillæ. The septa are thin, long, not prominent, and do not reach far into the centre at the margin; but the larger reach far inwards at the base of the fossa. The larger are plain, and the rest are denticulate. The union is made close to the wall and halfway down the calice.

Height $1\frac{1}{10}$ inch. Breadth of calice $\frac{3}{10}$ inch.

Locality. Found with the species just described.

Genus PLACOPSAMMIA, Reuss.

PLACOPSAMMIA DARWINI. (Plate XL. fig. 4.)

The corallum has a broad ascending base, which narrows suddenly and is continued upwards as a cylindrical tube-like corallum, one diameter being slightly greater than the other. Buds project from the same height as the parent, in a whorl, and pass upwards and outwards. There is no epitheca; and the costæ are well developed, nearly equal, broad, distinct, and sharply multigranular. The intercostal spaces show synapticulæ, and are distinct. The calice is elliptical in outline, and rather deep; the margin is densely reticulate and stout; and the septa, barely exsert, are thin, long, and do not project much from the margin. There are twelve nearly equal septa (1 & 2); and the tertiaries are not so well developed as those of the fourth cycle. All these last are rather spiny on their internal margins; and their approach and contact with each other is very slight and low down. There are four perfect cycles, and in one or two systems an order of the fifth. The columella is deeply seated, is well separate from the septa, is lamellar and granular, the granules being long. It is long, arched, and thin at the surface.

Height of corallum $1\frac{1}{4}$ inch. Breadth of calices $\frac{3}{10}$–$\frac{4}{10}$ inch.

Locality. Galapagos Islands. Collected by Mr. Darwin.

EXPLANATION OF THE PLATES.

Plate XXXVIII.

Fig. 1. *Conocyathus zelandiæ*, nat. size.
2. Ditto, coral, magnified.
3. Ditto, calice, magnified.
4. *Deltocyathus orientalis*, side view.
5. Ditto, side view, magnified.
6. Ditto, calice, magnified.
7. Ditto, a septum, magnified.
8. *Paracyathus persicus*.
9. Ditto, side view, magnified.
10. Ditto, calice, magnified.
11. *Paracyathus coronatus*, side view.
12. Ditto, side view, magnified.
13. Ditto, calice, magnified.
14. *Polycyathus atlanticus*, side view.
15. Ditto, side view, magnified.
16. Ditto, calice, magnified.

Plate XXXIX.

Fig. 1. *Agelecyathus persicus*, side view.
2. Ditto, side view, magnified.
3. Ditto, calice, magnified.
4. *Agelecyathus helenæ*, group.
5. Ditto, costæ, magnified.
6. Ditto, calice, magnified.
7. *Brachytrochus simplex*, side view.
8. Ditto, costæ, magnified.
9. Ditto, calice, magnified.
10. Ditto, septum, magnified.
11. *Javania insignis*, side view.
12. Ditto, upper part, side view, magnified.
13. Ditto, calice, magnified.

Plate XL.

Fig. 1. *Oculina cubaënsis*, group.
2. Ditto, calice, magnified.
3. *Cylicia tenella*, var., calice, magnified.
4. *Placopsammia darwini*, calice, magnified.
5. *Dendrocora fissipara*, nat. size.
6. Ditto, costæ, magnified.
7. Ditto, calice, magnified.
8. *Astrangia minuta*, calice, magnified.
9. ——— *epithecata*, calice, magnified.

Plate XLI.

Fig. 1. *Antillia lonsdaleia*, side view, nat. size.
2. Ditto, calice, nat. size.
3. *Sclerohelia hirtella*, calice, magnified.
4. Ditto, second calice, magnified.
5. *Balanophyllia helenæ*, nat. size.
6. Ditto, calice, magnified.
7. *Balanophyllia striata*, nat. size.
8. Ditto, costæ, magnified.
9. Ditto, calice, magnified.

3. On some Cranial and Dental Characters of the existing Species of Rhinoceroses. By WILLIAM HENRY FLOWER, F.R.S., V.P.Z.S.

[Received May 15, 1876.]

While engaged lately in cataloguing the osteological specimens of the genus *Rhinoceros* in the Museum of the Royal College of Surgeons, and at the same time, through the kindness of Dr. Günther, examining those at the British Museum (the two collections comprising a total number of fifty-four skulls), several points in relation to the distinctive characters of the different species came under my notice, which I think may be worth bringing before the Society.

The principal distinguishing characters in the skeleton, dentition, and even the folds of the skin, of three distinct forms of Asiatic rhinoceroses were clearly and concisely pointed out by Cuvier in the third volume of the last edition of the 'Ossemens Fossiles' (1834). De Blainville *, Duvernoy †, and Blyth ‡ have also added to our knowledge of the same three forms, which in fact appeared to be well established as the only ones existing in that region of the world. The late Dr. Gray, however, with far more abundant material at his disposal than either of the above-named zoologists, came to very different conclusions from them, both as to the number, distinctive characters, and relations of the various species of the group §; and it is partly with the view of ascertaining how far his views can be accepted that the observations about to be recorded have been made. It is the more necessary that this should be done without further delay, as Dr. Gray's arrangement of the species has already been adopted in zoological and palæontological literature ||.

As is well known, the existing Asiatic Rhinoceroses are sharply differentiated from those of Africa by the presence, throughout life, of well-developed and functional incisor teeth. The Museum of the College of Surgeons contains eighteen skulls of rhinoceroses of the former group of various ages, most of them, unfortunately, without locality. The British Museum contains twenty, making a total of thirty-eight Asiatic skulls, upon which the following observations are based.

The whole of these, in my opinion, can be grouped into three

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* Ostéographie des mammifères. Tome iii. "Rhinocéros" (1846).

† "Nouvelles études sur les Rhinocéros fossiles," Arch. du Mus. t. iii. 1854–55.

‡ "A Memoir on the living Asiatic Species of Rhinoceros," J. Asiat. Soc. Bengal, xxxi. 1862, p. 151.

§ "Observations on the preserved Specimens and Skeletons of the *Rhinocerotidæ* in the collection of the British Museum and Royal College of Surgeons, including the Descriptions of three new Species," P. Z. S. 1867, p. 1003: mostly reprinted, with the illustrations, in the 'Catalogue of the Carnivorous, Pachydermatous and Edentate Mammals in the British Museum,' 1869.

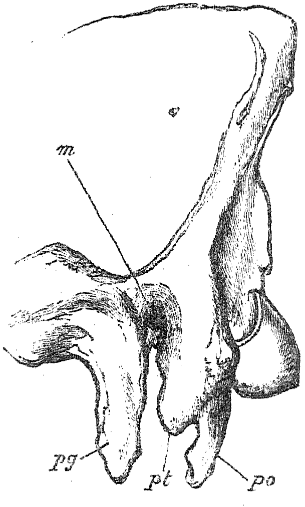
|| See R. B. Foote, *Rhinoceros deccanensis*, 'Palæontologica Indica,' 1874.

distinct types, and no more, these three exactly coinciding with those described by Cuvier. Whether more species exist of which we have as yet received no specimens, or whether any of these types, as I have called them, represent several species separated by characters, external or anatomical, not available at present, I cannot say, especially in the prevailing uncertainty of the use of the word "species." I only mean to imply that there is nothing that I can distinguish in the materials at hand to justify their further separation.

These three are (arranged according to size) :—1. *R. unicornis*, Linn., = *R. indicus*, Cuv. (R. A. 1817); 2. *R. sondaicus*, Cuv. (in Desmarest, Mamm. 1822), = *R. javanicus*, F. Cuv. & Geoff. (Mamm., 1824); 3. *R. sumatrensis*, Cuv. (R. A. 1817). The skulls of these three species can be distinguished from one another at a glance, at any age.

Leaving out numerous minor characters, for which I must refer to the works previously mentioned, the skull of the last (*R. sumatrensis*) is separated from either of the others by a most readily recognized peculiarity in the structure of the squamosal bone, which I believe has not been generally observed. I should, perhaps, rather say that the peculiarity exists in the former two species, and that *R. sumatrensis*

Fig. 1.



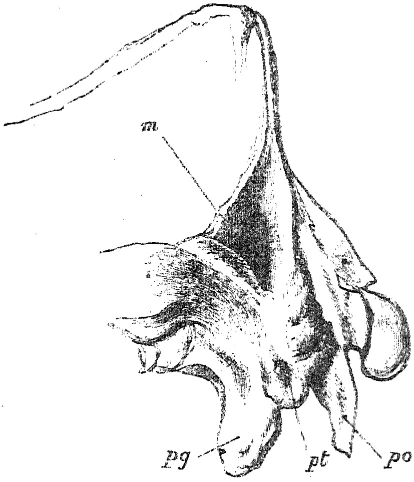
Side view of posterior part of skull of *Rhinoceros sumatrensis*. One fourth natural size.

m, External auditory meatus; *pg*, postglenoid process of the squamosal; *pt*, posttympanic process of the squamosal; *po*, paroccipital process of the exoccipital.

[All the figures are from specimens in the Museum of the Royal College of Surgeons.]

conforms to the normal mammalian type, seen in *Palæotherium*, *Tapirus*, *Equus*, &c. It is that the post-glenoid and post-tympanic processes of the squamosal (fig. 1, *pg* and *pt*) do not unite below the meatus auditorius (*m*), and that the latter is, as far as the squamosal bone is concerned, a groove and not a canal, and the floor of the meatus is formed solely by the tympanic; whereas, in both existing one-horned species (fig. 2) these processes (even in the newborn animal) are in contact for a considerable space, and in old animals are ankylosed together, so that the squamosal completely surrounds the meatus as in elephant. The African rhinoceroses conform with the Sumatran in this respect, though the groove is not so wide; so that this conformation of the squamosal may be said to characterize all the existing two-horned species.

Fig. 2.



Side view of posterior part of skull of *Rhinoceros sondaicus*. One fourth natural size.

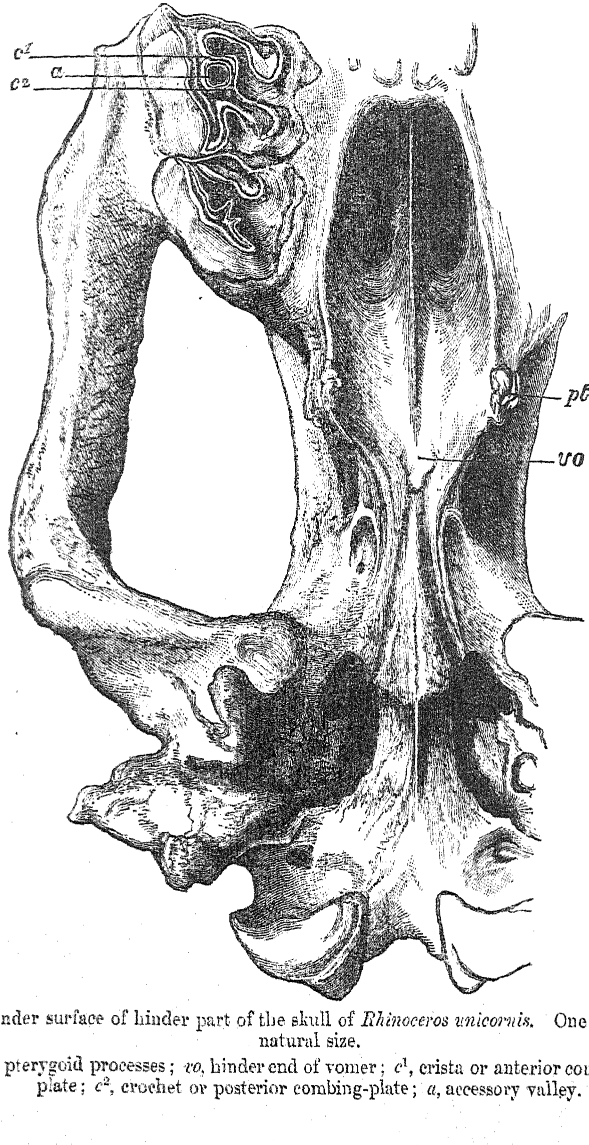
The letters as in fig. 1.

A second character, but far less important, by which the skull of the Sumatran Rhinoceros can be distinguished from that of its Asiatic congeners is the backward position of the occipital crest, which overhangs the nearly vertical occipital surface, whereas in the others the latter slopes forwards and upwards from the condyles to the crest (see figs. 1 and 2).

The slight prominence for the second horn, situated rather anterior to the centre of the conjoined frontal bones, is another diagnostic character.

It is interesting to note that in all these characters, as well as in

Fig. 3.

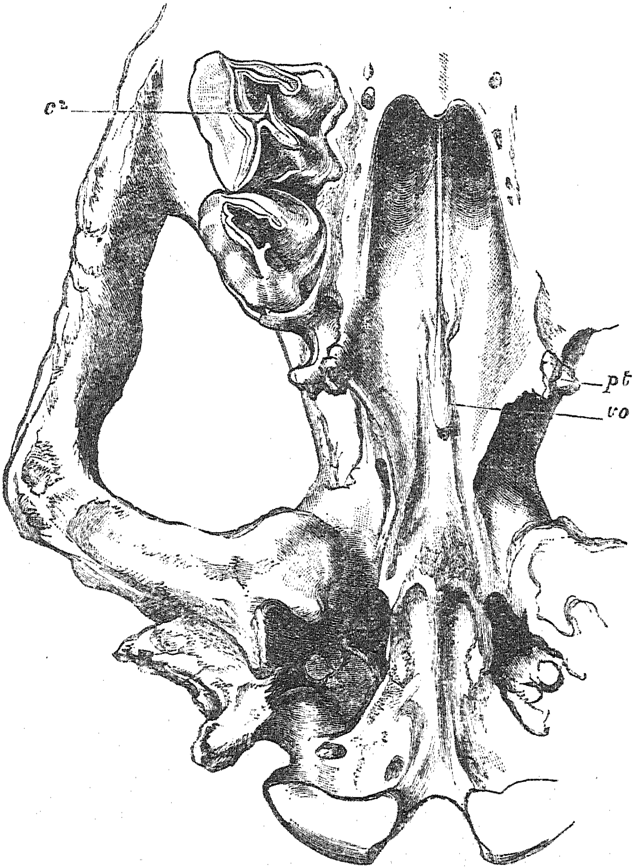


Under surface of hinder part of the skull of *Rhinoceros unicornis*. One third natural size.

pt, pterygoid processes; *vo*, hinder end of vomer; c^1, crista or anterior combing-plate; c^2, crochet or posterior combing-plate; *a*, accessory valley.

the smaller size of the incisor teeth *, this species occupies a somewhat intermediate position between the one-horned Asiatic and the African species.

Fig. 4.



Under surface of hinder part of the skull of *Rhinoceros sondaicus*. One third natural size.

pt, pterygoid processes; *vo*, hinder end of vomer; c^2, crochet or posterior combing-plate.

R. unicornis and *R. sondaicus*, being otherwise more nearly allied must be separated by less decisive, though by no means less constant and scarcely less recognizable characters.

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* And, it may be added, the tendency to the loss of the lateral and the constant absence of the central lower incisors, which are present in all the specimens of *R. unicornis* and *R. sondaicus* examined, with the exception of one aged individual of the latter.

In the former, besides the greater general size and greater length and height of the cranium as compared with breadth, the ascending ramus of the mandible is considerably higher in proportion (a character much relied on by Blyth), so that the whole skull, when mounted upon the lower jaw, is more elevated. The occipital surface also is markedly higher and narrower than in *R. sondaicus*. But in addition to these well-known and obvious characters, there are certain features in the conformation of the base of the skull which are eminently characteristic of the two species, and which when once recognized cannot be mistaken, and are superior for diagnostic purposes to those derived from the general form and proportions, or from parts of the skull the form and dimensions of which are influenced by muscular development, the size of the horns, &c., and consequently very liable to individual variation.

In *R. unicornis* (fig. 3) the mesopterypoid fossa is always narrower than in *R. sondaicus* (fig. 4); and the same condition extends backwards throughout the basi-sphenoid and basi-occipital bones, not only relatively to the size of the skull, but absolutely, the point of junction between these two bones being, in large skulls of *R. unicornis*, actually narrower from side to side than in much smaller specimens of *R. sondaicus*, though generally making a more salient projection downwards. Furthermore, the free ends of the pterygoid processes (*pt*) are compressed and deeply grooved in *R. unicornis*, whereas in *R. sondaicus* they are more flattened and laterally expanded. The hinder margin of the palate is more regularly concave in the former, and has a projection in the middle line in the latter. But the most absolutely diagnostic structural difference is seen in the hinder end of the vomer (*vo*), which in *R. unicornis* is thickened and firmly united by its sides to the base of the pterygoid processes, while in *R. sondaicus* it is thin, lamelliform, pointed, and free, so that in museum specimens it is very often injured or destroyed.

The upper molar teeth of *R. unicornis* and *R. sondaicus* are remarkably unlike for species otherwise so nearly related*; but the same kind of difference exists between the two best-distinguished species of the African forms, *R. simus* and *R. bicornis*; so that the characters of the teeth alone, which have been so much relied on in the case of the extinct species, are not, when taken by themselves, good tests of affinity.

In *R. unicornis*, in the first and generally in the second molar, the *crochet* (or posterior combing-plate) (c^2) curves forwards and usually unites with the *crista* (anterior combing-plate) (c^1) developed from the lamina, so as to cut off an "accessory valley" (a) from the extremity of the median sinus†. The premolars and milk-molars present a similar conformation, subject to individual variation. This never takes place in the true molars of *R. sondaicus* (though it may occasionally in some of the milk-molars, especially the second), as in fact the crista is rarely developed in that species, and the crochet is a simple straight free process in the true molars, though often double in the premolars.

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* Professor Owen says truly in his 'Odontography,' p. 594 (1845):—"Even in existing species so nearly allied as the unicorn Rhinoceroses of India and Java, each might be determined by a single detached molar tooth." But his views must have been subsequently modified; for in the descriptive catalogue of the Museum of the College (1853), the skulls of both species are described under the common name of *R. indicus*.

† For an explanation of these terms see Busk, P. Z. S. 1869, p. 410, "Notice

On the other hand the molar teeth of *R. sondaicus* and *R. sumatrensis* are remarkably alike. Mr. Busk, it is true, has pointed out characters by which they can be distinguished *; but they are such as to require great attention on the part of the observer to detect, and one of them, the difference in the relative length and breadth, does not appear to me to bear the test of application to a considerable series of individuals. I may, however, add another, which appears to be tolerably constant, viz. the greater depth of the posterior as compared with the median sinus in *R. sumatrensis*, whence it results that in an extremely worn tooth of the latter there are always two fossæ, the median and posterior, while in *R. sondaicus* the posterior disappears, leaving finally only a single fossa in the wide surface of exposed dentine. In *R. unicornis*, in a corresponding stage of attrition, there are three *fossæ*—the median, accessory, and posterior.

The premolars of *R. sumatrensis* can be distinguished from those of *R. sondaicus* by the complete absence of the double crochet above mentioned as usually, if not always, present in the latter.

It is a curious circumstance that the remains of *R. sondaicus*, though more recently distinguished as a distinct species, are more abundant in our collections than those of *R. unicornis*. In the College-of-Surgeons Museum there are 9 skulls of this species, and 5 of *R. unicornis*. In the British Museum the numbers are respectively 9 and 7. This may be accounted for by the geographical range of the species, as it is *R. sondaicus* which inhabits the Bengal Sunderbunds, and the neighbourhood of Calcutta, while *R. unicornis* is only known from the hilly country to the north, bordering upon Nepal, Bhotan, and Assam. On the other hand, judging from the figures, nearly all the living examples of rhinoceroses brought to this country before the present specimen of *R. sondaicus*, which was acquired by the Society in 1874, have belonged to the species which we call *R. unicornis*; but this is a subject which has been discussed in Mr. Sclater's article on the species of *Rhinoceros* living in the Society's Gardens, shortly to be published in our 'Transactions' with magnificent illustrations of external characters of five species drawn from life.

To return to the collection of skulls. Judged by the tests above given, and by other characters more difficult to describe, but easily appreciated on an examination of the specimens, the one described

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of the Discovery at Sarawak, in Borneo, of the fossilized Teeth of Rhinoceros." In one of the specimens of *R. unicornis* in the British Museum, though the crochet and crista are well developed, there is no actual union of their extremities.

* *Loc. cit.*

and figured by Dr. Gray in the paper above referred to as *R. floweri*, and called in the Catalogue of the Museum of the College of Surgeons *R. sumatranus*, is a very characteristic specimen of *R. sondaicus*, belonging perhaps to what Blyth would call the narrow type of that species. It was presented by Sir Stamford Raffles together with the Sumatran specimens, though no locality is recorded for this individual. This circumstance probably occasioned its being entered in the Catalogue as *R. sumatranus*; for although it is not certain that it came from Sumatra, it is quite probable, as we have now other reasons for believing that *R. sondaicus* is an inhabitant of that great island. The two skulls in the British Museum (supposed to be from Borneo) described by Dr. Gray as *R. nasalis* also present, in my opinion, no characters by which they can be distinguished from *R. sondaicus*, while on the other hand his *R. stenocephalus* is a young example of *R. unicornis*, or at all events has all the essential characters of that species as distinguished from *R. sondaicus*. The specific distinctions relied upon by Dr. Gray, the narrowness and rounding of the upper surface of the skull, appear to me far too liable to individual variation to constitute valid characters without other evidence *.

A skeleton, lately received at the British Museum, through Mr. Franks, of Amsterdam, from Sumatra, is *R. sondaicus*, thus affording confirmatory evidence to that already obtained † of the presence of both the two-horned and one-horned species in that island.

A still more interesting circumstance, as enlarging our knowledge of the geographical distribution of these animals, is, that the young skull obtained from Borneo by Mr. Low, of Labuan, added last year to the British-Museum collection, and of the habitat of which there is not a shadow of uncertainty, as in the case of the other supposed Bornean skulls in the same collection (which are *R. sondaicus*), belongs to the two-horned species or *R. sumatrensis*. This fact, with that lately recorded by Mr. Sclater ‡, of the occurrence of this form in Assam, give the two extremes at present known of its range.

A question has lately arisen whether there may not be two species of Asiatic two-horned rhinoceroses. Cuvier already believed that there were two varieties in the island of Sumatra, distinguished by their size; but the question has been brought into prominence by the presence in our gardens of two living animals of the same sex, one from Chittagong, and one from the southern part of the Malay peninsula, presenting such differences of size, colour, length of tail, and distribution of hair, that they would strike any zoologist as being examples, if not of different species, at least of very well marked varieties. In the former light they have been regarded by Mr. Sclater, who has bestowed the name of *R. lasiotis*, or Hairy-eared

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* Mr. Busk (P. Z. S. 1869, p. 413, foot-note) has already recorded his opinion that all these three species of Dr. Gray are indistinguishable from *R. sondaicus*. As regards the first two, as will be seen above, I am of the same opinion, but not as regards the third.

† The teeth brought by Mr. Wallace and described by Mr. Busk, and the probability of the skull presented to the College of Surgeons by Sir T. Raffles being from that island.

‡ P. Z. S. 1875, p. 566.

Rhinoceros, on the larger and lighter-coloured individual, retaining the name of *R. sumatrensis* for the smaller one, of which we have recently received a second example.

This determination has been called in question by Dr. Gray; and there are certainly some difficulties in deciding which of the two is the original *R. sumatrensis* of Cuvier (R. A. 1817), founded on Bell's description and figure in the 'Philosophical Transactions' for 1793, as that animal, if correctly drawn, must have been in some respects intermediate between our two living forms. On the whole, however, I am most inclined to think that the small and dark species (Dr. Gray's *Ceratorhinus niger*) is the nearest to Bell's Sumatran Rhinoceros, which is the view taken by Mr. Sclater. There is a skull in the Museum of the College of Surgeons (No. 2936), presented by Sir Jôseph Banks, which is stated in the first edition of the Osteological Catalogue (1831) to have been the original of that figured by Bell in the 'Philosophical Transactions.' If this could be proved to be the case, it would satisfactorily determine the cranial characters of the true *R. sumatrensis*; but the discrepancies between the figure and the skull are so great* that, with every allowance for inaccuracy on the artist's part, it is impossible to believe that they could be intended for the same; and, indeed, the author of the second Catalogue (1853) appears to have come to this conclusion, as the reference to the Phil. Trans. is omitted in the description of the specimen. It is, however, extremely probable that the skull in question may have been sent to Sir J. Banks by Bell, as the latter had more than one specimen and was in communication with Sir Joseph, who presented his memoir to the Royal Society; and therefore it may fairly be regarded as a representative of the same species.

As long as the type of Sclater's *R. lasiotis* lives, the important question as to whether any osteological or dental characters are connected with the differences of external appearance cannot be determined; and as my present purpose is only with such characters, I must leave it out of consideration, and return to the eight skulls, four in the College of Surgeons, and four in the British Museum, that are available for examination.

Of those in the first-named collection, three are probably from Sumatra, having been presented by Sir Stamford Raffles; and the other is the one just mentioned, given by Sir Joseph Banks, probably also from Sumatra.

Of those in the British Museum, the locality of one is not recorded; one is from Pegu, having been purchased from Mr. Theobald; one is from Borneo, as previously mentioned; and the last is from the small dark-coloured animal, from Malacca, which died in the Society's Gardens in 1872, an aged female†. This differs from all the others in having no lower incisor teeth. Unless, as is probable, this is an individual peculiarity due to age, it is an important character. A specimen in the Brussels Museum is in an exactly similar condition.

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* Chiefly as regards age, as shown by the teeth, and not differences of any specific value.

† See Mr. Garrod's notes on its anatomy, P. Z. S. 1873, p. 92, where the remarkable difference between the structure of the mucous membrane of the intestine and that of *R. unicornis* is described. It is interesting to note

On comparing these skulls, can any character be found to indicate that they belong to more than one species? Of seven of them I have little hesitation in saying that the differences of proportion and general configuration which occur among them may well be considered within the limits of individual variation; but of one, that from Pegu, in the British Museum, No. 1461 *a*, I am doubtful. There are differences in the conformation of the base of the skull, and in the greater length and more compressed form of the post-glenoid process, which separate it from the others; but without further evidence of correlated differences in other parts of the organization, or without further specimens showing the same characters, I should not feel justified in considering these differences specific, knowing that the development of processes for the attachment of muscles are among the most variable of characters. I merely indicate them to direct the attention of any one who may have an opportunity of examining the skull of *R. lasiotis*, or of any fresh examples brought to this country, to compare them with this specimen, especially as Pegu is the most northern locality (and therefore nearest to Chittagong) of any of the skulls of this form of Rhinoceros. The three Sumatran specimens from Sir Stamford Raffles all differ somewhat in size and form; but, allowing for age, the Malacca specimen at the British Museum (*R. niger*, Gray) does not appear to differ materially from them.

Of African rhinoceroses, the British Museum possesses a fine series of eleven skulls, and the College of Surgeons five.

The two distinct types, exemplified by *R. simus*, Burchell, and *R. bicornis*, Linn., are recognizable at a glance. The larger size of the former, together with the depressed, spatulated form of the front end of the mandible, distinguish it at once. It is worthy of note that though the front of the jaws, especially the mandible, of the latter, are so much more reduced and narrow, the incisor teeth are better developed and more persistent. In a young *R. bicornis*, from Abyssinia, in which all the milk-molars are in place and worn, there are rudimentary incisors ($\frac{1}{1}$) in both jaws[*]; but in two specimens of *R. simus* of younger age, in which the milk-molars are quite unworn, and the last still concealed in its alveolus, there is no trace of incisors; so that, as far as this character is concerned, *R. simus* is

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that precisely the same circumstance was recorded, though very briefly, in a description of the viscera of a rhinoceros sent from Sumatra by Sir S. Raffles, of which Sir E. Home says (Philosophical Transactions, 1821, part i. p. 271), "the small intestines measured fifty-four feet six inches; the valvulæ conniventes are continued nearly through the whole extent, and in general circular, although not all so."

[*] In a specimen in the Museum of the College of Surgeons, figured in Owen's 'Odontography,' there are two incisors on each side in the mandible; and these sometimes persist to adult age, as shown by Dr. Gray, P. Z. S. 1869, p. 225. This distinction between *R. simus* and *R. bicornis* was also noticed by Duvernoy in the young specimens in the Paris Museum.

the most specialized of all the living Rhinoceroses. The broad form of the front of the lower jaw, as compared with *R. bicornis,* is quite well seen in these very young specimens.

With regard to the molar teeth, the same kind of difference occurs between these forms as between the two Indian one-horned species. The larger one has a greater complexity of arrangement, derived from the more frequent union of crochet and crista, cutting off an accessory valley. But it must be noticed that there is an extraordinary variation in this respect between two examples of *R. simus* of nearly the same age in the British Museum, so great, indeed, that, if supported by other characters, they might be taken to indicate specific distinctness. In fact they either do this or show that the precise pattern of the enamel-folds of the molar teeth, so much relied upon by palæontologists to distinguish species, is a rather uncertain character. In one of these skulls (No. 1003*a*) the crochet and crista are united in all the premolar and molar teeth of both sides. In the other (No. 1003 *b*), an older specimen, and somewhat smaller, though presenting all the general characters of the species, they are united only in the left second premolar, in both third premolars, in both first molars and in the right third molar. The want of symmetry throws some doubt upon the value of this character*; otherwise it might, combined with the smaller size and narrower nasals of this specimen (perhaps only sexual differences?), lend some countenance to the common belief among African sportsmen and travellers, that there is a second large species allied to *R. simus.*

In the smaller African rhinoceros, *R. bicornis,* the crochet and crista of the molar teeth are both well developed, but rarely united in the true molars, though frequently so in the premolars. Whether there is one or more species of this form, has long been debated by zoologists; but those who have given their verdict for two have founded their decision solely on external characters, chiefly the form and size of the posterior horn, and no attempt has ever been made to show whether any osteological or dental characters were correlated with these. In fact, until very recently there were no materials accessible for the investigation. The acquisition by the British Museum of two complete skeletons of the reputed *R. keitloa,* and others of *R. bicornis,* with the horns attached, has, however, rendered the investigation a practicable one. I have not yet had the leisure to make the careful examination of the whole skeleton which would be desirable; but, comparing the skulls and teeth of perfectly adult individuals presenting both varieties of horns, I have not been able to detect any differences either of size, general proportions, or relations of the various bones to each other, that could reasonably be called specific. All that can be inferred from this is, that I have not at present seen any thing derived from osteological or dental structures to confirm the belief in the existence of more than one species of the smaller type of African rhinoceros. Other observers may, with more ample materials, be more fortunate; and I am by no means disposed to underrate the testimony of many experienced field-naturalists on this subject. Such osteological evidence as we have upon the question, if applied to the genus *Equus*, would probably fail to distinguish the three well-recognized South-African species of Zebras.

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* And its variability as before noted, in specimens of undoubted *R. unicornis.*

The results derived from the examination of these fifty-four skulls of *Rhinoceros* may be thus tabulated:—

A. The adults with a single large compressed incisor above on each side, and occasionally a small lateral one; below, a very small median, and a very large, procumbent, pointed lateral incisor. The post-glenoid and post-tympanic processes of the squamosal united below the external meatus auditorius. The posterior occipital surface sloping from below upwards and forwards, the crest being anterior in position to the condyles. Nasal bones pointed in front. A single nasal horn. Skin very thick, raised into strong, definitely arranged ridges or folds. RHINOCEROS, Linn.

a. Larger size. Upper molar teeth with crochet and crista generally united, cutting off an "accessory" valley from the median sinus. Posterior end of vomer thickened and adherent. Mesopterygoid fossa and basi-occipital narrow. Hinder margin of palate regularly concave. Occipital surface high and narrow. Ramus of mandible high.

1. R. UNICORNIS, Linn.*
R. indicus, Cuv. (R. A. 1817).
R. stenocephalus, Gray (P. Z. S. 1867).

b. Smaller size. Upper molar teeth without crista. Posterior end of vomer thin and free. Mesopterygoid fossa and basi-occipital broad. Hinder margin of the palate produced in the middle. Occipital surface broad and low. Ramus of mandible low †.

2. R. SONDAICUS, Cuv. (in Desm. Mamm. 1822).
R. javanicus, F. Cuv. & Geoffr. (Mammifères, 1824).
R. floweri, Gray (P. Z. S. 1867).
R. nasalis, Gray (P. Z. S. 1867).

B. The adults with a single moderate-sized compressed incisor above, and a single, laterally placed, pointed, procumbent incisor below, which is sometimes lost in old animals. The post-glenoid and post-tympanic processes of the squamosal not meeting below the meatus auditorius. Occipital crest produced backwards so as to overhang the occipital surface of the skull. Nasal bones narrow and pointed anteriorly. A well-developed nasal and a small frontal horn separated by an interval. The skin thrown into folds, but not so strongly marked as in A. Ceratorhinus, Gray, P. Z. S. (1867) *.

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* Cuvier's names for this and the common African species are often preferred on the following grounds:—"The names of *R. unicornis* and *bicornis*, Linn., can be no longer retained, since more than one species is known, both of those with one and of those with two horns" (Van der Hoeven's Handbook of Zoology). But as a precisely similar objection can be raised against the names *indicus* and *africanus*, nothing is gained by the change.

† The differences in external appearance, and especially in the skin-folds, between *R. unicornis* and *R. sondaicus* are well seen in the figure published in the Society's 'Proceedings,' 1874, pl. xxviii.; also in two sketches in 'Nature,' April 9th, 1874, from the animals living in the Society's menagerie.

1. C. sumatrensis, Cuv. (R. A. 1817).
C. sumatranus, Raffles (Trans. Linn. Soc. vol. xiii. 1822, p. 268).
C. niger, Gray (Hand-list Edentates &c. Brit. Mus. p. 48, 1873).

2. C. lasiotis, Sclater (P. Z. S. 1872, p. 493).
(Anatomical characters unknown.)

C. In the adults the incisors are either quite rudimentary or entirely wanting. The post-tympanic and post-glenoid processes not united below the auditory meatus. Occipital crest produced backwards, and overhanging the occipital surface of the skull and condyles. Nasal bones thickened and rounded or truncated in front. An anterior and posterior horn in close contact. Skin without any definite permanent folds. Atelodus, Pomel (1853) †.

a. Smaller size. Incisor teeth always present in the young, and sometimes persistent as rudiments through life. Molar teeth with crista and crochet rarely united. Front end of mandible deep and compressed.

1. A. bicornis, Linn.
R. africanus, Cuv. (R. A. 1817).
R. keitloa, A. Smith (Cat. S. A. Mus. p. 7, 1837).

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* These terms may be taken either as generic, or as indicating natural sections of the Linnean genus *Rhinoceros*. The great differences in the visceral anatomy (referred to above) between this species and the first, tend to support the former view. Their significance will, however, be better understood, when the internal anatomy of the third section is known, and also that of *R. sondaicus*.

† Pomel divided the genus *Rhinoceros*, Linn., into three subgenera :—
1. *Acerotherium*, Kaup.
2. *Rhinoceros*, Linn.
3. *Atelodus*, Pomel.

The last is thus defined. "Os nasaux portant une ou deux cornes ; pied à trois doigts. Une ou deux paires d'incisives inférieures caduques en forme de simple tubercule souvent à peine sorti de la gencive, ou nulles ; pas de plis à la peau sur les espèces vivantes."

The following are the species assigned to this group :—
A. elatus (Croizet & Jobert)
A. leptorhinus (Cuv.) } extinct.
A. tichorhinus (Cuv.)
A. aymardi (Pomel)
A. bicornis (L.)
A. keitloa (A. Smith) } existing.
A. simus (Burchell)

("Catalogue méthodique et descriptif des vertèbres fossiles découverts dans le bassin hydrographique supérieur de la Loire," Part ii., in 'Annales scientifiques, littéraires et industrielles de l'Auvergne,' tom. xxvi. 1853, p. 114.)

b. Larger size. Incisor teeth, if ever present, disappearing very soon after birth. Molar teeth with crista and crochet generally united. Front end of mandible depressed and spatulate.

2. A. SIMUS, Burchell (Bull. Soc. Philomat. p. 96, 1817).

A. oswellii, Gray (P. Z. S. 1853, p. 46).

In reference to the name of this group, *Cœlodonta* (Bronn, Jahrbuch für Mineralogie, 1831, p. 51) was proposed for some teeth supposed to belong to a new genus allied to Rhinoceros, but subsequently identified as those of the well-known *R. tichorhinus*, Cuv.* It can scarcely be retained, however, for the group now under consideration, as its definition would include *R. unicornis*, and exclude many of the species without incisor teeth. It was, in fact, never equivalent to Pomel's *Atelodus*, though it might be used (as by Dr. Gray, *loc. cit.* 1867) by any one who thinks fit to separate *R. tichorhinus* generically from all the other members of the family. In the Catalogue of the bones of Mammalia in the British Museum (1862), Dr. Gray uses *Rhinaster* for all the species of existing African rhinoceroses; but in the memoir so often referred to above (1867) this name is limited to *R. bicornis* and *R. keitloa*, and *Ceratotherium* is introduced for *R. simus*. *Rhinaster*, as applied to the Rhinocerotidæ, appears to be later than *Atelodus*. It was, moreover, proposed by Wagler (Syst. Amphib. 1830) as a substitute for Illiger's genus *Condylura* (Insectivora), on account of the latter being inappropriate; but it has not been generally adopted. As the termination of such a term as *Ceratotherium*, by common consent of zoologists, has hitherto been restricted to extinct genera, its application to *R. simus* is inconvenient. Fortunately, in the grouping proposed above, the name is unnecessary, as the members of the family with the incisor teeth small or absent form a well-characterized, even if somewhat artificial, generic group, which scarcely needs further subdivision.

Although most of the known extinct species of *Rhinoceros* may be arranged under one or the other of the above sections, the definitions would have, as, indeed, might be expected, to be considerably modified to include them. Thus *R. schleiermacheri*, Kaup, of the late European Miocenes, though allied to *R. sumatrensis* in possessing incisor teeth and two horns, and so far coming under the definition of *Ceratorhinus*, retains the central lower incisors of *Rhinoceros* proper, and has the post-glenoid and post-tympanic processes united, as, indeed, have all the extinct forms that I have examined. On the supposition that this species is the direct ancestor or representative of the *Ceratorhinus* group of modern times, the presence of the four inferior incisors, as a more generalized character, is quite natural; but the structure of the squamosal is not so easy to understand, as being more specialized than in the modern species. Precisely the same occurs with the former representatives of the *Atelodus* group, of which the Miocene *R. pachygnathus*, Wagner, from Pikermi, is the earliest known form, and the four extinct British species, *R. etruscus*, Falc., *R. leptorhinus*, Cuv., *R. hemitœchus*, Falc., and *R. tichorhinus*, Cuv., are more or less modified members. The recently discovered *R. deccanensis*, Foote, from South India, appears to belong to it also. The several species found in the Siwalik beds and other parts of South Asia appear to have belonged to the genus *Rhinoceros* as restricted above, with large incisors and one horn.

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* *R. antiquitatis*, Blum., is the earliest name for this species, and is adopted by Brandt and Dr. Falconer, though Cuvier's name still holds its ground with most authors.

To include all the extinct members of the family at present known; the genus *Aceratherium*, Kaup, must be added for the species with no horn, large incisors, and four toes on the fore feet, *Diceratherium*, Marsh, for species with indications of a pair of lateral horns on the nasals, and *Hyracodon*, Leidy, for primitive forms without horns and retaining the complete number of forty-four incisor, canine, and molar teeth, the latter of comparatively simple structure without crochet or crista. When we extend our search for Rhinocerotidæ beyond the Miocene period, we find that they cease to be recognizable as such, and become merged into more generalized perissodactyle forms.

4. Further Notes on *Oulodon*, a new Genus of Ziphioid Whales from the New-Zealand Seas. By JULIUS VON HAAST, Ph.D., F.R.S., Director of the Canterbury Museum, Christchurch, New Zealand.

[Received May 1, 1876.]

It will be seen from the following notes that the presence of a row of small teeth in the upper jaw is a constant character in my *Mesoplodon grayi* (P. Z. S. 1876, p. 7); and unless it shall be shown by future researches that other species belonging to the genus *Mesoplodon* have similar rows of small teeth and of a permanent character in the upper jaw, I think that the generic term *Oulodon* ought to be applied to the Ziphioid Whales distinguished by that peculiar feature, which, so far as I am aware, no others of the group possess.

Since I had the pleasure to lay the description of the three skulls obtained on the Chatham Islands before the Society, four specimens belonging to the same Ziphioid, which with our local fishermen goes under the name of Cowfish, have been stranded on the coast near Saltwater Creek, about 30 miles north of Banks Peninsula. One of them, a small male (A) about 13 feet long, was washed ashore on the 15th of December, 1875. On the 29th of December another male (B), 12 feet 9 inches long, was stranded, together with a female (D), 17 feet 6 inches long, on the beach a short distance north of the entrance of the Saltwater-Creek Estuary; whilst another male (C), 13 feet 8 inches long, ran the same day into that small estuary, and was left high and dry by the receding tide.

As I was fortunate enough to obtain two of these skeletons complete, I shall be able to send one of them to my friend Prof. W. H. Flower as a type specimen, and for description; and I therefore leave the osteological details to him. Although the bones are not yet quite macerated, I may state that the female, exceeding by nearly 4 feet the largest male obtained, is a full-grown animal, whilst the three males are all immature specimens. I measured the length of its lower jaw, and find that it is 2 feet 8·50 inches long, consequently nearly 1 inch longer than the lower jaw of the dried skull which I assigned to a full-grown female, and to which it bears a close resemblance. The mandibular tooth could scarcely be felt when passing the finger over the gums of this specimen; and its existence could scarcely have been ascertained in that way had I not known its exact position.

On the other hand, in all the three male skulls the point of the mandibular tooth protruded already, even in the smallest, through the gums, and the more laterally extended size of that portion of the lower jaw was at once discernible. I measured also the lower jaw of the male skull (B), and found it to be 1 foot 11·85 inches long; consequently its size is intermediate between the two Chatham-Island skulls no. ii., of which the lower jaw measures 2 feet 6·03 inches, and of the immature no. iii., which is only 1 foot 7·75 inches long.

All the four skulls possess from seventeen to nineteen teeth on both sides of the roof of the mouth; so that this character can now be claimed as being constant and specific.

As to the external features of this species, its form may be described as being rather elegant; the head is tapering; and the beak-like rostrum runs out to a point, so that it was not inappropriately compared by one of the workmen to the beak of a bird.

The colour of the back is black, getting a little lighter near the tail, where it assumes a dark slate tint; the lower side is reddish brown, near the tail assuming on both sides a more blackish hue.

The blowhole is situated in the centre; it is about 6 inches in diameter, and the corners are directed forward. The animal possesses a large falcate dorsal fin, situated rather backwards; and the pectoral fins are small and somewhat pointed.

The following measurements were taken from the immature male (C):—Total length 13 feet 8 inches; girth round body 18 inches behind pectoral fins, where the animal has its largest size, 9 feet; from point of rostrum to anterior border of pectoral fin, 3 feet 5 inches; from posterior end of dorsal fin to centre of tail-lobes, 4 feet 3 inches.

5. On the Birds collected by Dr. Comrie on the South-east Coast of New Guinea during the Survey of H.M.S. 'Basilisk.' By P. L. Sclater, M.A., F.R.S., Secretary to the Society.

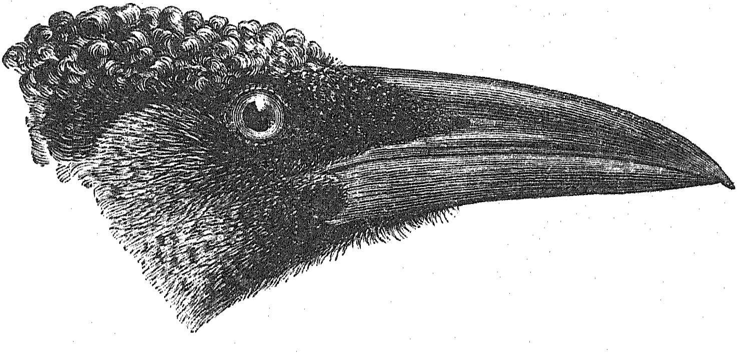
[Received May 15, 1876.]

(Plates XLII. & XLIII.)

Dr. Comrie has placed in my hands for determination some bird-skins collected by him while serving as medical officer in H.M.S. 'Basilisk,' during its recent survey of the south-east coast of New Guinea under the command of Capt. Moresby*. The collection contains thirteen skins, belonging to eleven species, of which one is quite new to science, and two others are only known from single specimens. Their names are as follows:—

1. Corvus orru, Bp.

One example from Huon Gulf, south-east coast of New Guinea, nearly opposite New Britain.



Head of *Manucodia comrii.*

2. Manucodia comrii, sp. nov. (Plate XLII.)

Nitidissime sericeo-æneo-viridis, fere unicolor, in ventre purpurascens: capitis cervicisque undique plumis revolutis quasi cincinnatis: alis caudaque intus nigris, extus dorso concoloribus, paulo in purpureum trahentibus: rostro elongato, ad nares sulcato, nigro: pedibus nigris: long. tota 17·0, *alæ* 9·5, *caudæ* 7·0, *rostri a rictu* 2·2, *tarsi* 1·7.

Hab. Papuæ reg. meridionali-orientalis, Huan-Gulf (*Comrie*).

This is by far the finest and largest of the peculiar genus now generally termed *Manucodia* (formerly *Phonygama*) yet discovered. It is immediately distinguishable from *M. chalybeia* and *M. atra* by its much larger size and longer bill, which is deeply sulcated at the nostrils. The characteristic curling of the feathers is extended to a greater degree than in *M. chalybeia*, and pervades the whole of the head and neck. The feathers of the abdomen are black at the base, broadly margined with purple.

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* See Capt. Moresby's narrative in his 'Discoveries and Surveys in New Guinea and the D'Entrecasteaux Islands.' London: 1876. 1 vol. 8vo.

Dr. Comrie obtained a single specimen of this fine bird in May 1874 in Huan Gulf. It was shot flying amongst the trees in the scrubby forest about a quarter of a mile from the coast.

3. DACELO GAUDICHAUDI, Quoy et Gaim.

Huon Gulf, one skin.

4. LORIUS HYPŒNOCHROUS.

Lorius hypoinochrous, Gray, List of Psitt. p. 49 (1859); Brenchley's Voy. p. 380, pl. 14.

Domicella hypoinochroa, Finsch, Papag. ii. p. 768.

Three skins of this fine Lory were obtained by Dr. Comrie in Possession Bay*, S.E. New Guinea, in April and May 1874. On comparing them with the typical specimen in the British Museum, which was obtained by Macgillivray during the voyage of the 'Rattlesnake' on one of the islands of the Louisiade group, off the S.E. coast of New Guinea, I find that they differ in the absence of the slight black band across the under wing-coverts, which is found in the typical specimen. There is likewise rather more blue on the abdomen of Dr. Comrie's skins. These differences are, in my opinion, too slight to warrant specific separation.

5. CARPOPHAGA PINON (Quoy et Gaim.); Bp. Consp. ii. p. 37.

6. CARPOPHAGA SPILORRHOA, G. R. Gray.

One skin from South-east Cape, New Guinea.

7. CALŒNAS NICOBARICA (Linn.).

One skin, obtained in Huan Gulf in April.

8. MEGAPODIUS MACGILLIVRAII. (Plate XLIII.)

Megapodius macgillivrayi, G. R. Gray, P. Z. S. 1861, p. 289, & 1864, p. 43.

A single skin of this little-known Megapode, obtained by Dr. Comrie on the shores of Huan Gulf in May, agrees tolerably well with the typical specimen of the species in the British Museum. The chief difference remarkable is in the more rufescent tinge of the lower back of the present specimen, which may be shortly described as follows:—

Supra fuscescenti-olivaceus, dorso postico rufescentiore: subtus saturate cinereus, hypochondriis et crisso olivaceis: rostro et

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* Possession Bay will be found marked in Capt. Moresby's map, p. 1; see also the text, p. 208. It seems to lie between Hayter Island and the opposite south-eastern point of the mainland of New Guinea.

pedibus flavis, unguibus nigris: long. tota circ. 13·0, *alæ* 8·7, *caudæ* 3·2, *tarsi* 2·6.

The figure is taken from Dr. Comrie's skin.

9. ESACUS MAGNIROSTRIS (Geoffr.); Gould, B. of Austr. vol. vii. pl. 6.

One example from Huan Gulf.

10. STERNA MELANAUCHEN (Temm.).

One skin, obtained in the D'Entrecasteaux Islands in March, is referable to this species, as Mr. Howard Saunders kindly assures me. Mr. Gould has already recorded its occurrence in Torres Straits (B. Austr. vii. pl. 28), where it was obtained by MacGillivray.

11. PHALACROCORAX, sp. inc.

A single skin of a young Cormorant, in nearly uniform brown plumage with yellow feet, obtained in Huan Gulf in May.

6. Additional Notes on *Dolichotis salinicola*. By HERMANN BURMEISTER, Director of the National Museum, Buenos Aires, F.M.Z.S.

[Received May 4, 1876.]

Since my former description of this new species of *Dolichotis*[*], I have been fortunate enough to have two fully adult living specimens sent to me for examination by a gentlemen who has had them alive in his house at Santiago del Estero. This gentleman informed me that this species is common in the country to the west of that town, its range beginning in the south near the small town of Chanar, and extending northwards along the borders of the great salina desert as far as Santiago del Estero and the river Dulce, where the country has the same sterile character, but not into the much more fertile region of the Province of Tucuman more to the north. Especially in the vicinity of Posta del monte and of the village of Piedritas near Chanar the animal is very common. The two living specimens, which are now under my inspection, show that my former description was taken from very young specimens of about half their full size, and that this northern species comes much nearer in size to the southern species (*D. patagonica*) than I was formerly led to suppose.

A fully adult specimen agrees very closely in size and colour with the Patagonian species, only differing slightly in some shades of colour and in shape. The head is somewhat shorter and stouter, more especially the anterior portion from the nose to the eyes (which was already indicated in the skull of the young animal), although the space between the nasals and the intermaxillaries is much longer, this space equalling half the length of the nasals in the northern species, and not more than one third in the southern;

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[*] See P. Z. S. 1875, p. 634.

also the legs are somewhat shorter in the northern species, and the body is broader behind. There is considerable difference in the coloration between the young and adult. As is shown by my figure and description of the former, the reddish-yellow tint is mixed with the grey over the whole upper surface, leaving the underside white, separated at the sides from the more homogeneous reddish grey colour of the upper surface. In the adult these three colours are more completely separated from each other, only the middle of the back being grey, the sides of the body yellow, and the underside white. This separation, already indicated on the head of the young animal, is continued as it becomes older over the whole body, as is also the case in the Patagonian species, which shows the grey on the front of the body gradually getting darker towards the rump, where it is nearly black. This black shade very well marks the specific difference between the two species; for in the northern (*D. salinicola*) the grey colour is more clear and of a more pure whitish-grey; but in the southern species (*D. patagonica*) the tint is somewhat yellower, resembling more an ash-grey. From the middle of the back this colour becomes darker in both species, till it forms over the region of the pelvis a large dark patch, the posterior edge of which is sharply defined from the white of the lower parts in a transverse line, which crosses the rudimentary tail, and extends to the haunches, where the white and yellow colours are shaded into each other. This patch affords a good diagnostic character for the separation of the species, its colour in the Patagonian species being blackish brown and in the northern species blackish-grey; for in the latter there are a number of white punctuations which are totally wanting in the former. In all other respects the colour is the same; so that many observers would believe the new species to be only a variety of the other species, if they were not aware of the differences in the skulls already pointed out in my former description.

I regret not being able to give any further particulars as regards the skull and skeleton of this *Dolichotis*, as I was not allowed to kill one of the specimens; but as soon as one of them dies I will send to the Society a full description of it.

Buenos Aires, 28th March, 1876.

June 6, 1876.

Dr. A. Günther, F.R.S., V.P., in the Chair.

The following report on the additions to the Society's Menagerie during the month of May 1876 was read by the Secretary:—

The total number of registered additions to the Society's Menagerie during the month of May 1876 was 99, of which 23 were by birth, 33 were by presentation, 28 by purchase, 4 by exchange, and 11 were received on deposit. The total number of departures during the same period by death and removals was 115.

The most noticeable additions during the month were:—

1. A fine specimen of the Tooth-billed Pigeon (*Didunculus strigirostris*), purchased May 9th, being the third example of this rare bird received alive by the Society.

2. An example of the White-backed Trumpeter (*Psophia leucoptera*), presented May 20, by Mr. H. Stacy Marks, A.R.A., F.Z.S. This bird, which has been in the Society's Gardens on deposit since October last, has not been previously exhibited in the Collection.

3. A pair of Curassows (apparently *Crax viridirostris*, mihi, Trans. Zool. Soc. ix. p. 282), from Cartagena, purchased May 31st. Of these birds I shall have something to say in a paper containing additions to my memoir on the Curassows living in the Society's Gardens, which I have in preparation.

4. A mother and three young of the Indian Fawn-coloured Field-mouse, *Mus cervicolor*, Hodgson (Jerdon, Mamm. of India, p. 206), presented by Lieut. Col. C. S. Sturt, C.M.Z.S., and received May 31st. Col. Sturt writes me that he captured the mother, when shooting hares near Rajcote, with the three young ones hanging to her teats. The species is common in Kattiawar, inhabiting the hedgerows and fields.

5. A Blue or Soft-billed Duck (*Hymenolæmus malacorhynchus*), from New Zealand, presented by the Acclimatization Society of Otago, and received May 31st. This bird unfortunately arrived in an exhausted state, and died very shortly. It is the first example of this curious species that has reached us.

I have also to call attention to the collection of Indian animals made by the Prince of Wales during his recent tour in India, which His Royal Highness has been pleased to deposit in our Gardens for exhibition. This collection consists of the following animals:—

I. Mammals.

2 Green Monkeys (*Cercopithecus callitrichus*).
2 Rhesus Monkeys (*Macacus erythræus*).
5 Tigers (*Felis tigris*).
7 Leopards (*Felis pardus*).
1 Cheetah (*Felis jubata*).
1 Viverrine Cat (*Felis viverrina*).
1 Indian Civet (*Viverricula indica*).
4 Tailless Dogs (*Canis familiaris*, var.).
3 Tibetan Mastiffs (*Canis familiaris*, var.).
2 White Dogs (*Canis familiaris*, var.).
2 Indian Wild Dogs (*Canis primævus*).
1 Himalayan Bear (*Ursus tibetanus*).
1 Sloth Bear (*Melursus labiatus*).
4 Indian Elephants (*Elephas indicus*).
6 Domestic Sheep (*Ovis aries*).
2 Thar Goats (*Capra jemlaica*).
4 Shawl-Goats (*Capra hircus*, var.).
8 Indian Antelopes (*Antilope cervicapra*).
2 Zebus (*Bos indicus*).
2 Spotted Porcine Deer (*Cervus minor*).
3 Axis Deer (*Cervus axis*).
2 Musk-Deer (*Moschus moschiferus*).

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II. Birds.

1 Grey-winged Blackbird (*Turdus pœcilopterus*).
2 Wedge-tailed Pigeons (*Treron sphenura*).
5 Domestic Pigeons (*Columba domestica*, var.).
8 Surat Doves (*Turtur suratensis*).
1 Black Francolin (*Francolinus vulgaris*).
2 Hill Francolins (*Arboricola torqueola*).
4 Chukar Partridges (*Cacabis chukar*).
15 Impeyan Pheasants (*Lophophorus impeyanus*).
21 Cheer Pheasants (*Phasianus wallichii*).
2 Pucras Pheasants (*Pucrasia macrolopha*).
4 White-crested Kaleeges (*Euplocamus albocristatus*).
3 Bankiva Jungle-fowl (*Gallus bankiva*).
10 Horned Tragopans (*Ceriornis satyra*).
5 Indian Peafowl (*Pavo cristatus*).
3 Ostriches (*Struthio camelus*).
86

The whole collection contains 65 specimens of Mammals and 86 of Birds, referable to about 30 species, not including domestic varieties. Of these the most interesting in a scientific point of view are:—

1. A pair of Thar Goats (*Capra jemlaica*), from the higher Himalayan ranges. A male of this fine species of Wild Goat was presented to the Society in 1852, by Capt. Towuley Parker, and is correctly figured in Wolf and Sclater's 'Zoological Sketches,' vol. i. pl. 25; but no example of it has been since received.

2. Two examples of the "Khar Laghuna, or Lesser Porcine Deer (*Cervus minor*)" of Hodgson, from the Terai of Nepaul. Of this form of Deer, which appears to be a valid species intermediate between the Axis and the Hog Deer, no previous specimens have reached this country.

3. Two male Musk-deer (*Moschus moschiferus*), from the Himalayas. The Society have previously had but one female of this delicate animal, presented by Sir F. R. Pollock in 1869.

The Secretary exhibited specimens of a Land-crab from Ascension Island, which had been presented to the Society by Dr. S. B. Drew, and read the following remarks upon them by Dr. Drew:—

"The Land-crab, found on the Island of Ascension, belongs, I believe, to the species *Geocarcinus lagostoma*; it inhabits the mountain-ridges, particularly on the weather-side of the island, owing perhaps to the greater amount of moisture found there. They burrow in holes, and are but seldom seen during the heat of the day, except after dawn and on their return-journey from the sea, when they are easily killed. They commit great ravages on the island, destroying the eggs and young of the various kinds of game, besides the vegetation. The following incident came under my own observation:—While out shooting, a very young rabbit, which I wished to capture alive, crossed my path and retreated into a hole in the rock; at the bottom of the hole, and away from the reach of my arm, was a Land-crab, which, undismayed by my presence, pounced on the unhappy Rabbit and killed it before I could come to its rescue. The earliest records of the island tend to show that the Land-crabs have always been troublesome, as a reward was and is now given for their destruction. I have only observed them going to the sea during the months of February and March. Their journey to the sea is only made at night or towards evening; on their return they come at all times. I do not know at what season they cast their shells; but I am led to think, from the number of old ones I have seen, that it is soon after their return from the sea. They are but seldom eaten on the island, although when properly cooked they form no mean dish; but they are not of nearly so delicate a flavour as the West-Indian Land-crab."

Mr. Sclater exhibited skins of the male and female of the new Pheasant from Borneo, lately described by Mr. Sharpe (Annals of Nat. Hist. ser. 4, vol. xiv. p. 373) as *Lobiophasis bulweri*, and figured in Part 27 of Gould's 'Birds of Asia.'

A pair of these birds had been procured from Borneo in December last by Mr. Scheepmaker, of Sourabaya, agent to the Royal Zoological Society of Amsterdam. The male bird had died in Java; the female had been forwarded alive to Amsterdam, but had arrived in a weak condition and lived only a few weeks. Mr. Westermann's kindness had enabled Mr. Sclater to exhibit these fine birds, of which the female was previously unknown, and might be described as follows:—

LOBIOPHASIS BULWERI, fem. (Plate XLIV.)

Brunnea, subtus in castaneum vergens, fusco omnino minutissime vermiculata: capite minus rufescente et in gutture valde pallidiore: lateribus capitis totis nudis, in ave viva cærulescentibus, carunculis utrinque duabus minutis, altera ad latus menti, altera ad nucham sitis: remigibus et rectricibus saturate brunneis, unicoloribus: cauda rotundata, e rectricibus ut videtur xxviii. *composita: rostro corneo, pedibus rubris: long. tota* 20, *alæ* 9, *caudæ rectr. ext.* 3·7, *med.* 5·7, *tarsi* 3·5.

Obs. There are slight indications of the tarsal spurs in the female. The tail is not perfect; but there appear to have been at least 28 rectrices (an extraordinary number); and in the skin of the male I make 15 on one side, so that 30 is probably the full complement. Mr. Sharpe does not give the number of tail-feathers in his specimen.

Mr. Garrod, who kindly examined the body of the female, reports the gizzard as strongly muscular; the small intestine 5·4 in., the large 4 ft. 6 in. in length; the cæca 6 in. in length; the oil-gland nude or very slightly tufted.

The sternum, which I exhibit, appears to be very like that of *Euplocamus*.

Mr. Sclater read an extract from a letter addressed to him by Mr. J. H. Gurney, F.Z.S., dated Northrepps, Norwich, May 23rd, 1876. Mr. Gurney stated that a pair of the variety of the Common Swan, usually called the Polish Swan (*Cygnus immutabilis* of Yarrell), which had been deposited by the Society under his care for the purpose of breeding, had just hatched five healthy Cygnets, which did not appear to Mr. Gurney to differ materially from those of the ordinary form. The general colour of the upper parts was brownish grey with a slight tinge of dull pale rufous; the head, throat, and breast were white. The white colour, however, was not abruptly marked off from the grey, but the boundaries of the two tints were somewhat blended.

Mr. Sclater remarked that the usual notion was that in the Polish Swan the Cygnets were invariably of a pure white*, and that it was for the purpose of ascertaining whether this idea was correct that the pair of Swans in question had been placed under Mr. Gurney's charge, at the suggestion of Prof. Newton, in order that they might have a better chance of breeding. The Swans had been originally received of a dealer in exchange in May 1871, and had not bred in the Society's Gardens, the space available for them being too limited.

The following papers were read:—

1. Notes on the Skeleton of *Ziphius novæ-zealandiæ*. By JULIUS VON HAAST, Ph.D., F.R.S., Director of the Canterbury Museum.

[Received May 5, 1876.]

(Plates XLV. & XLVI.)

At the end of July 1872 the report reached me that a Whale had been stranded on a reef in Lyttelton Harbour, Banks Peninsula, and that the carcass had been towed to one of the small bays by several fishermen for securing the oil.

Being myself prevented by indisposition, Mr. Fuller, the Taxidermist of the Museum, proceeded to that locality with instructions to secure the skeleton and to make the necessary observations as to the dimensions, form, sex, and age of the animal.

When he arrived where the fishermen were at work, he found that the blubber had nearly all been taken off, so that he could only partially obtain the required measurements.

The animal, which on dissection proved to be an aged female, had a total length of 26 feet; and Mr. Fuller describes the body as being rather thick in the middle, tapering to a slender tail without showing the least trace of any dorsal fin. Colour bluish black on the upper portion of the body, white beneath, the upper portion being marked with numerous oval spots, 2 to 3 inches across, like the skin of a Leopard.

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* See Yarrell's 'British Birds,' vol. iii. p. 131 (1843).

Fig. 1.

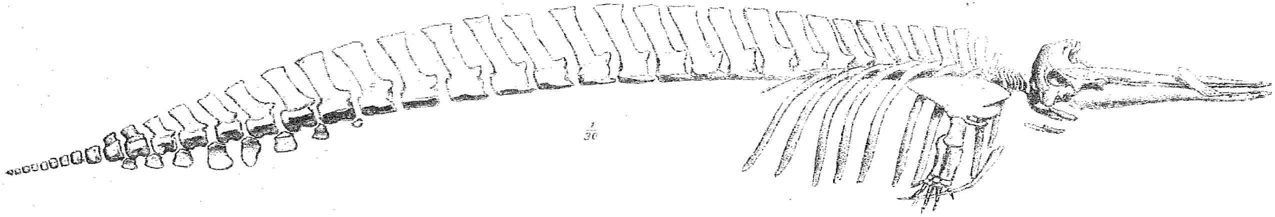
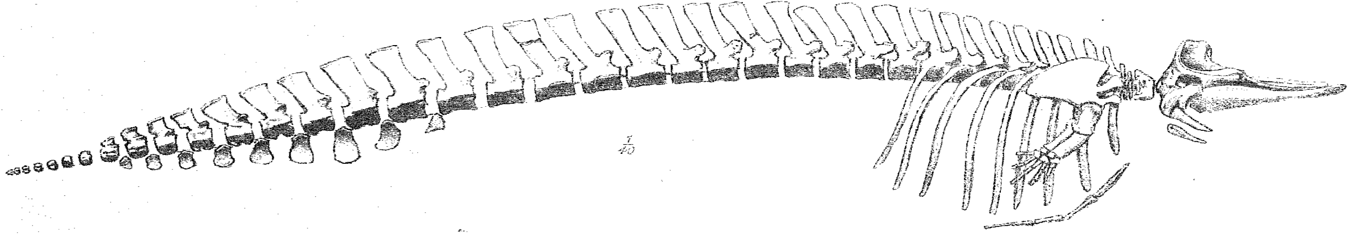


Fig. 2.



J. Smit lith.

Hanhart imp.

Fig. 1. SKELETON OF MESOPLODON FLOWERI.
Fig. 2. SKELETON OF ZIPHIUS NOVÆ ZEALANDIÆ.

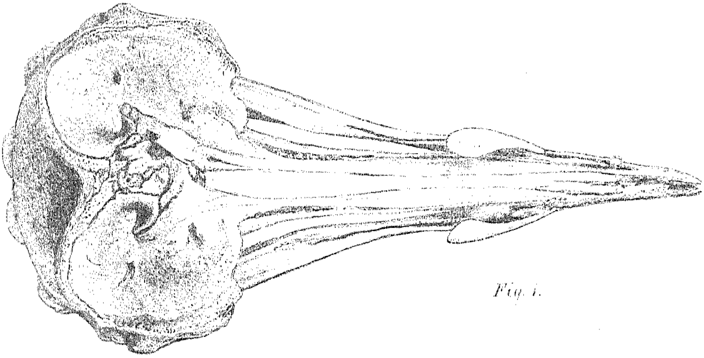


Fig. 1.

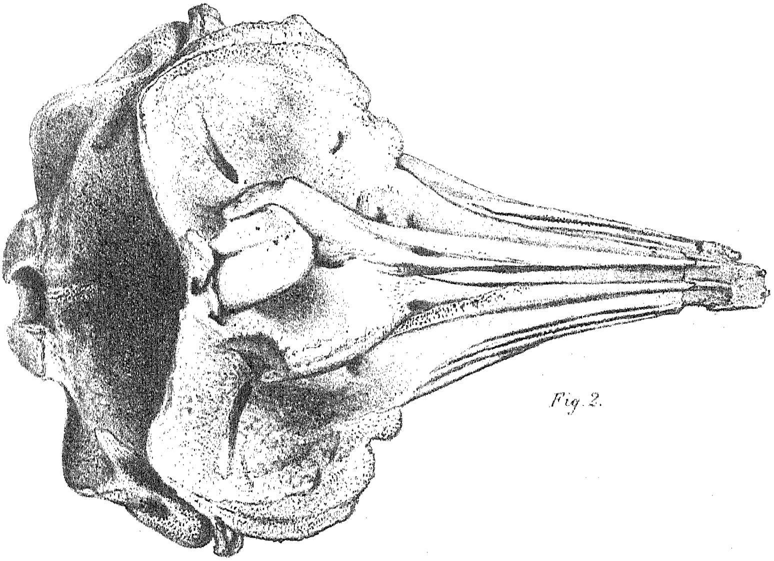


Fig. 2.

J. Smit lith.

Hanhart imp.

Fig. 1. SKULL OF MESOPLODON FLOWERI, *upper view.*
Fig. 2. SKULL OF ZIPHIUS NOVÆ ZEALANDIÆ, *upper view.*

The head was much swollen. The whole skeleton, with the exception of a few bones, was secured for the Canterbury Museum, where it now stands articulated in one of its rooms. The accompanying drawing (Plate XLV. fig. 2) gives its outline.

Before, however, entering into a description of the principal portions of the skeleton, I wish to draw attention to the fact that our specimen did not possess a dorsal fin; nor did a careful examination by Mr. Fuller of the central line of the back reveal the least fragment of one, or even the indication that it ever existed. However, this absence cannot be claimed as a generic character, because the *Ziphius australis* of Burmeister (see the excellent Memoir on that species in 'Anales del Museo Publico de Buenos Aires,' part v., by that distinguished veteran naturalist) possesses a well-developed dorsal fin.

Moreover the forehead of the New-Zealand species is much swollen, whilst the head of the South-American species previously alluded to is tapering. Thus, in the enumeration of the principal characteristics of the genus *Ziphius* (see amongst others Gray's 'Catalogue of Seals and Whales,' page 340), this feature also must lose generic value. Dr. Hector, in the 'Transactions of the New-Zealand Institute,' vol. v. page 165, has given a short description of the skull of a specimen, under the name of *Ziphius chathamiensis*, which, if not belonging to the same species, is closely allied to the animal of the New-Zealand coast. That skull was obtained on the Chatham Islands.

However, as amongst minor differences the form of the teeth is different, I have thought it more expedient to describe the New-Zealand specimen under the specific name of *Ziphius novæ-zealandiæ*, leaving it to the future student, when more material has been collected, to determine whether there are two distinct species or not.

The skull (Plate XLVI. fig. 2) has the following dimensions:—

	ft.	in.
Extreme length with lower jaw	3	3·12
Extreme length of cranium, point of rostrum (which is broken off) restored	3	1·50
Length of rostrum, from the apex of the præmaxillæ to the middle of the line drawn between the ante-orbital notches	1	7·89
Greatest height, from top of nasals to lower border of pterygoids	1	5·52
Greatest breadth, across postorbital processes of frontals	1	10·75
Breadth of occipital condyles		6·30
,, of foramen magnum		42·0
Height of foramen magnum		2·22
Breadth of base of rostrum between bottom of ante-orbital notches	1	0·91
Breadth of rostrum in the middle		4·83
Anterior nares, greatest width of the two		3·20
Height of crest above occipital foramen	1	2·93
Width of occiput	1	4·60

Mandible.

	ft.	in.
Length of ramus	2	8·50
,, of symphysis		7·46
Vertical height of ramus at coronoid process		6·40
Apex of mandible, projecting beyond apex of rostrum (restored)		1·62
Mandibular tooth (right), length		2·12
,, ,, greatest breadth		0·72
,, ,, weight	184 grains.	

It will be seen, in comparing these dimensions with those of the skull from Chatham Islands, figured and described by Dr. Hector, that it is larger and more developed, with the exception of the two mandibular teeth, which are much smaller and in the Chatham-Island specimen are evidently designed for other purposes.

The rostrum, of which the point is broken off, is of small dimensions when compared with the posterior portion of the cranium, its point being slightly turned to the right. This point was shattered into such a number of small pieces that, after maceration, it was impossible to secure them all. The same was the case with the point of the lower jaw, so as to suggest to us that the animal had struck the reef and thus injured so considerably that portion of its frame.

The *premaxillaries* are two thin bones which run parallel in their anterior portion. They here curve inwards, so as to form a semi-cylindrical excavation, running along the whole rostrum as far as the septum narium.

Before reaching this, however, they alter somewhat their general form, the rounded edge disappearing, the bones now showing a plane rather concave surface, and, gradually rising near the posterior end of the nares, unite here with the nasal bones, by which a high crest is formed. For about one third from the point both sides of the premaxillaries are alike, after which the right one becomes much broader than the left one; and, passing over the median line of the skull to the left, the skull now becomes very unsymmetrical in its central portion, so that the opening of the nares is displaced to the left. Moreover the uppermost portion of the right premaxillary, besides being broader, is much higher than the left one—a peculiarity to which also the nasal bones conform, the right one being considerably higher than the left one. The prefrontals (of Owen) begin 6·5 inches from the anterior point of the rostrum, gradually widening to one inch, being slightly concave in the centre for a length of 8 inches. They then gradually flatten for a distance of one inch, after which they become convex until they rise and form the thin ridge of the septum narium. The latter is wedged in its anterior portion against the left premaxillary, and, continuing its direction to the left, joins then obliquely the nasal bones. In the centre of the nares, the septum narium is excavated for a depth of nearly 2 inches and a width of 1·20 inch, the bone having here a very sharp edge.

Shortly before the septum narium is formed, the premaxillaries coalesce for a short space*.

The *maxillaries*, which begin with a narrow point having a downward sloping surface, gradually widen ; and, after having in about the centre of the rostrum a plane surface, the outer side rises to the orbital notch, after which they expand greatly with a deeply concave surface, rising posteriorly to the highest part of the crest, uniting with the frontals through their whole extent.

The high maxillary crest of *Hyperodon* is represented only by a small elevation at the begining of the broad concave surface, similar to that in *Ziphius australis*, as pointed out by Prof. H. Burmeister in his exhaustive description of that South-American species.

A deep and narrow furrow begins on the lower side of both premaxillaries near the point, continuing after their junction with the maxillaries along the latter bones, where it runs below their lateral edge to about the middle of the rostrum, gradually getting shallower and narrower. In these grooves small vascular cavities are observable, as if they had once served for rudimentary teeth, of which, however, not the least remnant could be observed, all without doubt having been absorbed.

The vomer begins 5·5 inches from the point of the rostrum between the premaxillaries, forming for 8·76 inches a narrow convex ridge, which in its broadest or central portion is only 0·25 inch broad. The palatal surface of the rostrum is slightly bent upward near the point.

The *united periotic and tympanic bones* are of considerably less size than those of *Berardius arnouxi*. The tympanic bone is shorter, the anterior end not being so much prolonged and thus resembling more in form the same bone in *Hyperodon*. The same can be said of the periotic bone, which is also not only shorter, but has the notches between the lobes much shallower than in *Berardius*.

The *lower mandible*, which projects about 2 inches beyond the point of the rostrum, consists of two thin callous rami, which gradually become narrower till their termination at the point, the bony substance of which they are composed getting more spongy towards the begining of the symphysis. From this beginning the united bones curve upwards. At the point two small teeth are imbedded in sockets, the tips rising only a few lines above them. They are covered with rugose cement to the very point, which, in their lower part, forms wartlike prominences.

As there is scarcely any difference between the two teeth, I give only the dimensions of one of them, the left one, which is 2·12 inches long, with the greatest breadth about at the centre of 0·72 inch. It weighs 184 grains, and runs out at both ends to a constricted rounded point, that of the apex being the narrowest.

It will thus be seen that the weight of this tooth, although it belongs to a skull of larger dimensions than the one obtained from the Chatham Islands, described by Dr. Hector, is scarcely the fourth of the weight of the tooth of the latter. It is moreover evident that the teeth of the Chatham-Island specimen must have been used, as, according to the description, they are worn down into two lateral facets, divided by an acute ridge (see 'Transactions New-Zealand Institute,' vol. v. page 165), whilst in the New-Zealand specimen the tips are as rough as the sides and roots and do not show the least sign of wear.

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* I give these details, because in another skull of the same species which the Canterbury Museum possesses, and of which I shall give the measurements with some notes below, besides some minor points, a very marked difference occurs in the form of the prefrontals.

We know that the two skulls of the New-Zealand specimens belong to female skeletons, whilst the skull of the Chatham-Island specimen may possibly have been that of a male; but as we have not the least evidence in that respect, this can only be settled by future researches into the anatomical characters of this interesting genus.

Returning to the skeleton under consideration, I wish to state that the teeth were only visible after maceration, and appear to be altogether functionless, because the lower jaw projects so much beyond the rostrum—unless we assume that the whole had an upper lip of a somewhat prehensile character. On the upper margin all along the anterior half of each ramus a well-defined groove extends to the dental canal at the anterior extremity, where it is broadest. A considerable number of small vascular canals open into this groove, without, however, showing the least rudiment of teeth.

The coronoid process is marked very feebly; but the condyle is well developed and forms the most posterior portion of the bone. I may here observe that the skull of *Ziphius novæ-zealandiæ* resembles in some respects that of *Ziphius australis* of South America, notwithstanding the difference in the form of the head, the former having a swollen, and the latter having a tapering forehead. In many instances Prof. Burmeister's excellent description of some of its osteological characters could be applied quite well to the New-Zealand species.

Hyoid bones.

The basihyal and the thyrohyals are still unankylosed, notwithstanding the great age of the animal. The former has a somewhat trapezoidal form, thus resembling in that respect the same bone in *Ziphius australis*; but it is more pointed in its anterior portion and has a deep notch in the centre, whilst in the South-American species the anterior border is only slightly concave. Breadth 4·6 inches, antero-posterior length on both sides of the notch 4·1 inches. The thyrohyals have a length of 6·80 inches, with their greatest breadth of 2·55 inches one third from their posterior end.

The stylohyals are 10·8 inches long, and, in their middle portion, 2·1 inches broad; they are straighter than the same bone in *Ziphius australis*, which they resemble, however, otherwise in form. The whole apparatus is more slender than in the Buenos-Aires species.

Vertebral Column.

The following are the numbers of vertebræ:—

Cervical	7
Thoracic	9
Lumbar	11
Caudal	19
	46

In comparing this number with that observed in *Ziphius australis*, it will be seen that the New-Zealand species has three vertebræ less, viz. 9 thoracic instead of 10, and 19 caudal instead of 21, thus showing also some difference in the osteological structure of the two species. I may here observe that all the epiphysal plates of the vertebræ are so thoroughly coalesced with the rest of the body that the line of junction is not visible—a proof that the animal must have been not only adult, but aged.

Cervical Vertebræ.

Of these the first four are entirely ankylosed, whilst the 5th, 6th, and 7th are free, thus having one free vertebra less than *Ziphius australis*, in which only the first three cervical vertebræ are united; however, as this skeleton was derived from a young animal, this difference cannot be claimed as of a permanent character, until we know the skeleton of the same animal in a full-grown state. The atlas, which is 11·4 inches broad by 8·15 inches high, forms with the next two vertebræ one solid bone with a high crest; it is the largest of all the cervical vertebræ. The parapophyses (lower processes) in each of the coalesced bones, of which that of the atlas is the largest, are, with the exception of that belonging to the fourth, well developed. They decrease, however, gradually in size to the third, that of the fourth being of such small dimensions that it is an inch shorter than the same process in the preceding one, with which it is ankylosed at the upper and lower extremities, but not with the body.

The fifth cervical vertebra is very narrow, 0·55 inch; it has moreover no spinous process above the arch, the summit of which stands two inches below the point of the spinous process of the four ankylosed vertebræ; the parapophyses, although much larger than those of the fourth cervical vertebra, stand on the same line with them. The sixth cervical vertebra is a little broader than the preceding one; there is only an indication of a spinous process above the arch; the parapophyses are well developed, and advance half an inch beyond those of the former vertebra.

The seventh vetebra is slightly broader than the preceding one. It has a distinct spinous crest standing two inches above the arch. The lower process, or parapophysis, on each side has dwindled to a narrow tubercle, sloping upwards; the body of the bone has a well-marked articular surface for the head of the first rib, on both sides, which is situated between the well-marked upper transverse process (diapophysis) and the small tubercle representing the lower transverse process (parapophysis). These seven vertebræ have a length of 7·15 inches measured along the lower side of their main body.

Thoracic Vertebræ.

Their number, as before stated, is nine. In this respect the New-Zealand species resembles *Hyperodon*, which, as far as I am aware, is the only other known Ziphioid Whale having such a small number of thoracic vertebræ. Each vertebra has a spine standing backwards at an angle of 60 degrees to the body of the vertebra. That of the first one is pointed, 6·4 inches high, and 2·05 inches broad at the base. Gradually these spinous processes rise higher and become broader at the same time, that of the 9th or last thoracic vertebra being the highest, 11·62 inches, and 3·46 inches broad at the base. They are all laterally compressed, thinning out at the top to a mere blade.

The first two vertebræ possess on both sides of the arch a rounded apophysis, on which the articular extremity for the tubercle is placed. This apophysis gradually enlarges, being laterally compressed and showing one well-marked process pointing upwards and forwards, as well as the articulation for the tubercle for the rib, which is situated more backward.

On the seventh vertebra this separation of the apophysis is still more conspicuous, whilst on the eighth vertebra a separation of that apophysis into two distinct portions has taken place, the forward or superior process now appearing as the metapophysis, whilst its lower or posterior portion forms now a lower transverse process, on which the articular surface for the eighth rib is situated, directed obliquely backwards.

This lower transverse process is already situated in front, on the body of the vertebra, but on its upper portion. This division is still more conspicuous in the ninth or last thoracic vertebra, where the metapophysis has nearly the same form as that on the first lumbar vertebra, with the exception that its upper surface has a rounder instead of a horizontal edge. The lower transverse process has a more depressed, flattened form; moreover it is situated not only in the centre of the body of the vertebra, but also lower down and nearly on the same level as the same process in the first lumbar vertebra.

The bodies of the vertebræ gradually increase in size, the first having an antero-posterior length of 1·65 inch, and the ninth, or last, of 4·1 inches.

The inferior surface of the first thoracic vertebra is rough and rounded. The second, third, and a small portion of the anterior part of the fourth have a shallow concave groove, after which on the fourth a median keel appears, which continues to run along the rest, gradually becoming more pronounced.

Lumbar Vertebræ.

The nine thoracic vertebræ are succeeded by eleven lumbar vertebræ, which nearly all possess the same form, attaining larger dimensions as they follow each other, so that the body of the last is the largest—viz. 5·48 inches for the first, and 7·58 inches for the last lumbar vertebra. The spines are of considerable size, the first being 13·25 inches high along its posterior margin; they then gradually rise to the eighth, which is 15·52 inches high, after which they diminish again slightly. They are compressed as usual, and broader at the apex, which has a truncate form, as if they were cut off.

The metapophysis on the anterior end of the arch is similar in form to that of the last thoracic vertebra, but a little larger in the first four vertebræ, its apex having moreover a still more truncated edge. Beginning with the fifth vertebra this process gets gradually smaller, assuming at the same time a more rounded form. They all possess on their inferior surface a median keel, which is most pronounced on the 5th, 6th and 7th vertebræ, after which, getting shallower by degrees, it nearly runs out on the last.

The lower transverse process is throughout of the same form and size, having a horizontal and a little forward direction.

The *caudal vertebræ* are 19 in number, of which the first 10 have chevron bones attached to them on the posterior border of the lower surface, thus forming as usual two distinct classes.

The bodies of the *caudal vertebræ* shorten from 7·51 inches to the tenth, which is only 3·78 inches long, although their height is the same.

From the 1st to the 13th a broad shallow groove runs along their lower surface, after which they have a deep lateral excavation.

The spines are also gradually reduced in height to the tenth, in which the same is only 1·50 inch high. They continue, however, to possess the same truncated apex, with a downward slope from front to back, getting at their starting-point from the arch gradually larger, that on the 4th caudal vertebra being here the largest of the whole series of vertebræ.

The metapophyses also gradually diminish, and assume, instead of the former flattened form, now a stouter appearance with a more outward direction of the point.

The same diminution in size is observable in the lower transverse process, which on the 8th caudal vertebra forms only a very small ridge, but has entirely disappeared on the 9th. The 10th vertebra is very much laterally compressed; the 11th assumes a rounded form, which becomes more square in the 12th, after which the rest have a nearly quadrangular form to the last.

The last caudal vertebræ, beginning with the 10th, have a well-excavated channel running along both sides of the vertebræ. I may here observe that the last chevron bone, as well as the 17th and 19th vertebræ, are missing.

Ribs.

There are nine ribs on each side, of which seven possess two articulating processes. The first, which is the shortest of the whole series, is also the broadest. It is thick and flattened throughout. It articulates by a distinct capitular process with the body of the seventh cervical vertebra, and above by an excavated articular surface with the transverse process of the first thoracic vertebra.

From the second to the sixth, the ribs gradually lengthen, the sixth being the longest, after which they decrease again. The second has still the flattened appearance of the first, but in a lesser degree, after which they assume all nearly the same shape, the upper portion below the articulations or articulation having a prismoid form, which is most pronounced in the middle of the ribs, where they are also the most constricted, the edge being on the inner side; they then widen and flatten to their lower extremity.

The second to the seventh rib inclusive have, like the first, two articulations; a distinct capitular process for articulation with the vertebra in front, and an excavated articular surface slightly raised round the edges, into which the transverse process fits.

The eighth and ninth ribs have only one excavated surface, articulating with the end of the transverse process.

The greatest length of each rib, measured in a straight line, is:—

	ft.	in.
First	1	9½
Second	2	6½
Third	2	10¼
Fourth	3	0½
Fifth	3	2
Sixth	3	3¼
Seventh	3	2¾
Eighth	2	11¼
Ninth	2	5½

Sternum.

In the form of the sternum *Ziphius novæ-zealandiæ* shows a well-marked difference from *Z. australis* of Buenos Aires. It consists of five distinct segments, of which the first is the largest, having a greatest length of 14¼ inches, with a greatest breadth of 12½ inches.

The second, third, and fourth segments gradually diminish in both dimensions until the fifth, which is the narrowest but longer than the three preceding ones. The dimensions of the fifth are 7¾ inches in length with a breadth of 6 inches.

The first, which possesses a shallow keel in its upper portion, has a deep notch above it, and another in the centre of its basal portion. Similar fossæ exist in each of the succeeding segments, by which four median fenestræ are formed, gradually dimininishing in size, having their largest diameter in a vertical direction. There are six articular surfaces on each side for the sternal ribs—the first near the upper portion of the first segment, the second at the junction of the first and second, the third at the junction of the second and third, the fourth at the junction of the third and fourth, the fifth at the junction of the fourth and fifth segments, and the last at the posterior ends of the two narrow processes by which the fifth segment terminates. The entire length of the sternum in a straight line is 3 feet 1 inch.

A comparison with the sternum of *Ziphius australis* shows a great difference in the form of the segments of the fenestræ; and, as it appears to me, when mature, this species would only have four segments instead of five, thus agreeing with *Berardius arnouxi.*

Prof. Flower, in his excellent Memoir on *Berardius arnouxi*, figures the sternum as consisting of five pieces; but it is evident that the fourth and fifth segments are portions of the same bone, although they from some cause have not ankylosed.

In a skeleton belonging to the same species, which stands articulated in the Canterbury Museum, and which has been taken from a full-grown but not aged male, the disks on both sides of the vertebræ being not yet ankylosed, the sternum consists of only four segments.

The fourth and fifth pieces of the skeleton in the Hunterian Museum appear as one bone without any suture visible between them, the last two articular facets standing close to each other on the side of the fourth segment.

Pectoral limb.

The scapula has the usual form peculiar to the Ziphioid Whales; the acromion, however, is narrower and thinner than in *Z. australis*, in which that bone corresponds more with *Berardius arnouxi*. The coracoid is also shorter and stouter.

The humerus, to which the head is thoroughly ankylosed, has a well-defined tuberosity for articulation with the strongly excavated glenoid fossa of the scapula, and on its lower posterior side a groove for the articulation of the ulna; both ulna and radius have their articular surfaces well ankylosed, and do not call for any further remark.

The carpus differs considerably from that of *Berardius arnouxi*, of which Professor Flower gives a figure, and with which the carpus of another specimen articulated in the Canterbury Museum fully agrees. Instead of being united in pairs, the scaphoid and lunar and the cuneiform and unciform are all distinct, and only the magnum and trapezoid are united into one bone. They agree in this respect with the same elements in the carpus of *Mesoplodon sowerbiensis* of the Northern Hemisphere, whilst in the skeleton of *Ziphius australis* the magnum and trapezoid are also still separate bones. However, as this skeleton is derived from a very young animal, it may be possible that they unite in more aged individuals.

Notes on another Specimen.

A female Whale of somewhat larger dimensions, belonging to the same species, was stranded about the middle of July 1873 in Akaroa Harbour. According to Mr. Gorham Lambert, my informant, the animal was suckling a calf at the time; the latter, however, was thought not worth preserving by the finder. The skull of the mother Whale was secured for the Canterbury Museum.

From the following table of measurements it will appear that the skull is a little larger in all its dimensions than the one described previously, belonging to the skeleton in the Canterbury Museum.

Although the point of the rostrum is quite entire, the point of the lower jaw was considerably broken, which proves that the animal made considerable struggles to regain deep water, during which without doubt it injured itself in the same manner as the Lyttelton-Harbour specimen did. The skull under review is also derived from an aged individual; and, with the exception that its rostrum is rather narrower than that of the Lyttelton-Harbour specimen, it has otherwise somewhat larger proportions. The most marked difference, however, is in the form of the prefrontals. In this skull the premaxillaries are much more excavated, and stand 1·53 inch apart in the centre of the rostrum.

The prefrontals, as in the former skull, begin 6·50 inches from the point of the rostrum, forming at the beginning a ridge, which continues for about 11 inches, constituting the central portion of these bones and only gradually disappearing. For the last 5 inches they have a concave form; the premaxillaries here approach each other as in the Port-Lyttelton specimen, but stand always half an inch apart. Here the beginning of the septum narium rises to within the eighth of an inch of the surface of the premaxillaries, gradually getting thinner and turning obliquely to the left, resting against the left of these latter bones.

The excavation in the septum narium, however, is much deeper and wider than in the first-described skull, being 3 inches wide and 2½ inches deep.

There is also considerable difference in the teeth of the two skulls. The tooth of this skull is 2·85 inches long, and 0·61 inch broad; it is covered everywhere with rough cement, which forms, principally near the lower extremity, wart-like protuberances, taking near the root-end ridgy forms. It is consequently longer than the tooth of the Lyttelton-Harbour specimen, and, although the tenth of an inch thinner, is a little heavier (198 grains).

A portion of the pterygoid has been cut away when taking out the skull; otherwise it is in a fine state of preservation.

Table of Measurements.

	ft.	in.
Extreme length of skull with lower jaw	3	4·90
,, ,, of cranium	3	3·15
Length of rostrum from the apex of the præmaxillæ to the middle of the line drawn between the anteorbital notches	1	10·50
Greatest height from top of nasals to lower border of pterygoid..............................	1	5·85
Greatest breadth across postorbital processes of frontals	1	9·12
Breadth of occipital condyles..................		7·20
,, of foramen magnum................		2·62
Height of foramen magnum		2·31
Breadth of base of rostrum between bottom of anteorbital notches	1	0·50
Breadth of rostrum in the middle..............		5·00
Anterior nares, greatest width of the two		3·05
Height of crest above occipital foramen.........	1	3·20
Width of occiput	1	5·05

Mandible.	ft.	in.
Length of ramus	2	9·75
„ of symphysis		7·25
Vertical height of ramus at coronoid process		6·83
Apex of mandible projecting beyond apex of rostrum		1·75
Mandibular tooth, length		2·85
„ „ breadth, greatest		0·61

2. Remarks upon Dr. von Haast's Communication on *Ziphius novæ-zealandiæ.* By Professor Flower, F.R.S.

[Received June 5, 1876.]

I have to make the following remarks upon Dr. v. Haast's communication which has just been read to the meeting.

1. It should be stated that Dr. von Haast in his MS., which he submitted to me, has followed Dr. Gray in using the generic name *Epiodon* for the animal described; but I have taken the liberty of substituting the Cuvierian epithet *Ziphius*. With reference to the revival of the former name, I fully agree with the following remarks of Fischer[*]:—

"M. Gray considère l'*Epiodon urganantus* de Rafinesque[†] comme le type de *Ziphius cavirostris*. L'*Epiodon urganantus* est, pour Desmarest, son *Delphinus epiodon*; et voici les caractères qui lui sont attribués par Rafinesque.

'Corps oblong, atténué postérieurement; mâchoire inférieure plus courte que la supérieure; plusieurs dents obtuses, égales à celle-ci; aucune à la première; pas de nageoire dorsale.

'*Habite* la mer de Sicile.'

"Comme on le voit, le genre *Epiodon* et l'espèce *urganantus* sont plus que brièvement décrits; je pense qu'il est absolument impossible de les reconnaître, et qu'il serait sage de laisser reposer en paix les diagnoses de Rafinesque; on ne doit pas accorder de notoriété scientifique à de pareils travaux."

If, therefore, *Epiodon* is to be used for the present form, the almost universally received and well-characterized *Ziphius*[‡] would have to be discarded from zoology, as it cannot be with any reason or propriety transferred, as Dr. Gray has done, to another and very distinct genus (*Mesoplodon*, Gervais). It must be retained for *Ziphius cavirostris* and its allies, or given up altogether.

2. I do not see that Dr. v. Haast has given any grounds for distinction between his *Z. novæ-zealandiæ* and the previously described

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[*] "Mémoire sur les Cétacés du genre *Ziphius*, Cuvier," Nouv. Arch. du Muséum, tome iii. p. 42.

[†] 'Précis des découvertes et travaux somiologiques,' &c., p. 13 (Palermo 1814).

[‡] Cuvier, 'Ossemens fossiles,' 2nd edit. vol. v. 1824.

Z. chathamiensis (Hector) from the same seas*. Indeed, so far as can be judged from the description and photographs, the two specimens attributed to the former differ more from each other than does either of them from *Z. chathamiensis*, especially if, as Dr. v. Haast himself suggests, the difference in the size of the teeth is a sexual character.

3. The photographs sent by Dr. v. Haast of *Z. novæ-zealandiæ*, when compared with the specimen of *Z. indicus*, Van Beneden (*Petrorhynchus capensis*, Gray), at the British Museum, do not show any greater differences than are consistent with the range of individual variation.

4. The differences between the last-named species, or supposed species, and *Z. cavirostris*, Cuvier, and *Z. australis*, Burmeister, have never been clearly defined; no proof has therefore yet been given of the existence of more than one species of the genus.

5. Dr. v. Haast's specimen differs from all other known skeletons in having but nine ribs instead of ten. But it is not improbable that the last pair (often rudimentary and unattached to the vertebral column) may have been lost during the preparation. This appears more likely, because the ninth rib (as shown in the photograph) is larger than the last rib usually is in these animals, and the transverse process of the supposed first lumbar vertebra appears somewhat dilated at the end. Moreover the presence of one pair of ribs more or less is often only an individual character in the Cetaceans.

6. A more serious difference consists in the absence of the dorsal fin (hitherto met with in all members of the genus examined); but it must be noted that this is not Dr. v. Haast's own observation, and was made after "nearly all the blubber had been taken off."

3. Notes on *Mesoplodon floweri*. By Julius von Haast, Ph.D., F.R.S, Director of the Canterbury Museum, New Zealand.

[Received May 5, 1876.]

(Plates XLV. & XLVI.)

In the beginning of April 1874, the information reached me that a Whale about 18 feet long had been stranded on the sea-beach near Saltwater creek, about 30 miles north of Banks Peninsula; and although I did not lose any time in securing the skeleton for the Canterbury Museum, I was too late to obtain the necessary information as to form, colour, position of fins, etc., the animal having in the mean time been stripped in order to obtain the blubber.

Fortunately, however, no bone was lost; and on examination the animal proved to be a *Mesoplodon*, closely allied to a specimen obtained at the Cape of Good Hope, of which the skull has been described and figured by Dr. Gray, P. Z. S. 1865, p. 358, and subsequently by Prof. Owen, in vol. xxiii. of the publications of the Palæontographical Society of London, under the title of *Ziphius* (*Dolichodon*, Gray) *layardi*.

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* Trans. New-Zealand Institute, vol. v. p. 164, pl. iv. (1873).

So far as I am aware, nothing is known of that interesting animal except the skull with the lower jaw, between which and the New-Zealand specimen under review there exist some points of difference, as I shall point out further on; moreover, as I believe that the same species of Ziphioid Whale would scarcely exist in two regions so far distant from each other, I have thought it more expedient to designate the New-Zealand species by the specific term *floweri*, in honour of the accomplished anatomist, Prof. W. H. Flower, F.R.S., to whom the New-Zealand naturalists owe a great debt of gratitude for his excellent memoir on *Berardius arnouxi*.

The animal proved, on dissection, to be a full-grown male and or mature age, the terminal epiphyses of the bodies of the vertebræ being so thoroughly ankylosed that the line of junction could not be detected; and we can draw the conclusion from its osteological characteristics that it must have combined considerable strength with great swiftness, whilst at the same time the large and remarkable strap-like teeth must have given it a peculiar appearance.

The skeleton (Plate XLV. fig. 1), as now mounted, has a total length of 17 feet 9 inches, which closely corresponds with the measurement given to me, and taken before the flesh was removed from the skeleton.

The skull, of which I add an upper view (Plate XLVI. fig. 1), resembles in all its general features so closely the skulls of *M. layardi*, as described by Prof. Owen, that it would be superfluous to offer any detailed account of it.

Amongst other peculiarities, the frontals have also the same well-defined form, and appear as a dense convex ridge between the premaxillaries as in the Cape specimen.

Notwithstanding this general likeness, if we compare closely the figures of both skulls, it is nevertheless apparent that there exist some differences between them, of which I wish to point out the following ones:—

Thus the frontals in the Cape specimen rise higher above the maxillaries than in the New-Zealand specimen; and the occipital portion of the skull is far more rounded in the former than in the latter, in which the supra-occipital stands nearly vertical, whilst in the Cape specimen this portion of the skull has a considerable slope towards the foramen magnum. At the junction of the basioccipital with the temporal, the former enters the latter with a sharp angular projection, whilst in the New-Zealand specimen it has a rounded edge.

The interparietal in the New-Zealand specimen runs up to the crest a much narrower bone than in the Cape one, in which it has a rounded form near its junction with the frontals.

Besides the difference in the mandibular teeth to be pointed out hereafter, I find that the lower jaw is far deeper in proportion to its length in the New-Zealand specimen.

Measured on the drawing of that bone in the figure given by Prof. Owen, the total length of the lower jaw of *M. layardi*, from the point to the angle, is to the greatest depth as 8⅕ to 1, whilst in the New-Zealand specimen it is as 6½ to 1. In *M. layardi* the lower jaw is much more slender, the upper and lower border being very slightly inclined to one another, whereas in *M. floweri* the two borders form a much more open angle with one another, the upper border being very convex near the coronoid process. If both skulls were available for comparison side by side, I have no doubt that other differences would be detected, especially by a comparative anatomist of more experience than I possess.

There is an important difference in amount of curvature of the large tooth on each side of the lower jaw, which in the Cape specimen is so much arched that the apices of both teeth actually meet above the rostrum, a peculiarity which the late Dr. Gray thought could scarcely be a malformation. In the New-Zealand specimen that curvature, although existing, is not so pronounced, the point of the tooth standing in a vertical line above the centre of the root. Its form and position agree entirely with those of the tooth of a lower jaw brought from the Chatham Islands by Mr. H. Travers, and described and figured by Dr. Hector as *Dolichodon* (*Mesoplodon*) *layardi* in the fifth volume of the 'Transactions of the New-Zealand Institute.' Behind this mandibular tooth there is no partial hollow on the upper margin of the lower jaw, as if it were the cavity of an old tooth that had fallen out, as is the case in the Cape specimen, and which was first pointed out by Dr. Gray in his 'Catalogue of Seals and Whales in the British Museum.' The New-Zealand specimen under review thus conforms also in this respect to the lower jaw obtained in the Chatham Islands.

The anterior edges of both teeth, however, are perfectly intact, and not worn away like those in the Cape and Chatham Island specimens; a peculiarity which might be traced to individual habits, and is, I suppose, not of any specific value. There is no doubt that the New-Zealand and Chatham-Island specimens could open their mouths, as there is sufficient space for the rostrum to pass between the apices of the teeth. However, there has evidently been some abrasion on the inner side of both teeth near the crown, as they are here somewhat worn down and polished. The small enamelled portion rising on the anterior edge of the apex is not quite so large as in the Cape specimen.

The lower jaw from the Chatham Islands is 1·75 inch shorter than that of the specimen under review, in which latter the mandibular tooth is also much longer, which may be regarded as an individual difference only.

The following Table of measurements will also supply further material for comparison:—

Dimensions of the skull.	ft.	in.
Extreme length of cranium................	3	5·75
Length of rostrum from the apex of the præ-		

	ft.	in.
maxillæ to a line drawn between the anteorbital notches	2	3·48
Greatest height from top of nasal to lower base of pterygoids	1	3·80
Greatest breadth across postorbital process of frontals	1	3·22
Breadth of base of rostrum between bottom of anteorbital notches		5·90
Breadth of rostrum in the middle		2·71
Greatest width of the two nares		2·15
Height of crest above occipital foramen		8·75
Distance from point of rostrum to crest over blowers (in a straight line)	2	8·48

Mandible.

Length of ramus	2	10·75
Length of symphysis		8·05
Vertical height of ramus at coronoid process		4·82
Distance from the condyle to the hinder edge of the base of the mandibular tooth	1	9·53
Breadth of exposed part of mandibular tooth along upper margin of ramus		4·51
Length of mandibular tooth measured along anterior edge from upper margin of ramus to crown		8·74

Hyoid Bones.

The basihyal and thyrohyal are united into one bone; the two latter are each 4·5 inches long and 2·1 inches broad at their junction with the basihyal. The anterior edge of this bone is formed by two processes, advancing considerably beyond its general outline and separated in the centre by a deep notch, in which respect the bone resembles that of *Epiodon novæ-zealandiæ.*

The two posterior points of the thyrohyals stand 7·2 inches apart.

The stylohyals are 7·5 inches long; they possess a distinct head for their articulation with the skull, and have afterwards for some distance still a roundish form, then gradually flattening till about 2·5 inches from their anterior end they are 1·75 inch broad and 0·5 inch thick, the upperside having a sharp ridge and the lower side being flattened.

Vertebral Column.

The number of vertebræ are as follows:—

Cervical	7
Thoracic	10
Lumbar	10
Caudal	19
	46

Mesoplodon floweri thus agrees in these particulars with *M. sowerbiensis*.

Cervical Vertebræ.

Measured along the lower side of their main bodies, the seven cervical vertebræ have a total length of 5·75 inches. Of them, the atlas, second, and third vertebræ are united into one large triangular bone 8 inches broad and 6·10 inches high (see no. 16). Only their lower processes, of which those of the second are the largest, are free. The third vertetebra has two distinct transverse processes on each side, of which the higher one (diapophysis) is a thin bone, with its termination pointing downwards. The next four vertebræ are all free; and if we take into consideration that the skeleton under review belonged to a fully adult animal, there is no doubt that no further change in their relations to each other would have taken place.

The upper as well as the inferior transverse processes become gradually smaller as we advance towards the thoracic region. In the fourth vertebra the inferior transverse process has still a horizontal direction; in the fifth it assumes a downward slope, which is continued to the seventh, where it consists only of a small tubercle. Above it, on the side of the body of this vertebra, is the articular surface for the head of the first rib. The fourth vertebra had evidently a small spinous process, which doubtless was broken off in cleaning it; in the fifth the spinous process is 1·05 inch, in the sixth 1·53 inch, and in the seventh 2 inches high, all leaning a little forwards. The bodies of the last four vertebræ are broader than they are high. *M. floweri* therefore stands so far alone in regard to the arrangement of the cervical vertebræ, as no other Ziphiod Whale, so far as I am aware, has the first three cervical vertebræ ankylosed and each of the next four perfectly free.

Thoracic Vertebræ.

The species under review possesses ten, of which the bodies are all flattened from top to bottom and become gradually of larger dimensions, the body of the first being 1·12 inch, and the tenth 4·20 inches in postero-anterior length. The spinous process of the first is pointed and stands slightly forwards; that of the second stands nearly vertical, after which in the remaining eight vertebræ it gradually slopes more and more backward and becomes higher and broader. This process in the second and third has rather a rounded apex, after which it becomes more truncated in the rest.

The height of the spine of the first thoracic vertebra is 4·25 inches, of the tenth 9 inches.

The articulation for the head of the second rib is situated at the posterior end of the first vertebra, low, at the base of the arch; it rises gradually in the two next, so that in the third vertebra this articulation is placed some distance above that base, a position which it maintains in the fourth, fifth, and sixth, after which it disappears, the following ribs having only one articulation.

The transverse process, which springs from both sides of the arch, is in the first three vertebræ a rounded apophysis; in the next four vertebræ it gradually enlarges, becoming, as in *Epiodon novæ-zealandiæ*, laterally compressed, showing one strongly marked process pointing upwards and forwards, as well as a well indicated and posteriorly situated articulation for the tubercle of the ribs. A separation into two distinct processes takes place in the eighth, the forward or anterior process of the apophysis now appearing as the metapophysis, and its lower or posterior process forming a lower transverse process, starting as a small rounded prominence from the anterior border of the upper portion of the body, and on which the articular surface for the eighth rib is situated, directed obliquely backwards.

In the ninth vertebra this separation is still more accomplished, the metapophysis being well developed, and the transverse process, which springs now from near the centre of the body, although thicker and more rounded than those of the succeeding vertebræ, takes already its usual form. It has an articular surface for the ninth rib on its posterior end, with the same direction as in the preceding one.

The tenth vertebra, which is the largest of the series, has a very large transverse process, depressed and broad, on the edge of which the tenth small rib obliquely articulates. This transverse process is the broadest and longest of the whole series of vertebræ—those of the lumbar region, beginning with the first, getting by degrees shorter and narrower.

The transverse process of the ninth thoracic vertebra has a horizontal and somewhat backward direction; that of the tenth stands straight; whilst the same process in the lumbar and in the first series of the caudal vertebræ has, besides a slightly downward, also a forward direction. The bodies of the thoracic vertebræ up to the seventh have a flattened lower surface, after which a keel starts on the eighth, which is well pronounced on the ninth and tenth.

Lumbar Vertebræ.

The ten lumbar vertebræ resemble each other very much in form. Gradually they become more elongated, the first having an antero-posterior length of 4·55 inches, and the eighth of 6·30 inches, after which they shorten again a little. They possess each a median keel, and are compressed in the centre below the transverse process. The spinous processes are large and high, increasing to the eighth, which is 11·50 inches high, after which they slightly decrease. The arches arise from the centre of the bodies, thus differing from *Berardius* and *Epiodon*, where they have a more anterior position.

Caudal Vertebræ.

There are nineteen caudal vertebræ, of which the first ten have a deep channel running along their lower surface. The spinous processes gradually lose in height, that of the tenth vertebra consisting only of a slight excrescence. The lower transverse processes also shorten by degrees, so that in the sixth they are represented by a small horizontal ridge, which is only faintly indicated in the seventh. In the eighth, ninth, and tenth vertebræ all signs of such processes are missing; but they are also strongly laterally compressed. There are nine chevron bones, of which the last is missing. With the eleventh vertebra the second series of the caudal vertebræ begins, which in form greatly resemble those of the New-Zealand *Epiodon*.

Ribs.

There are ten ribs on each side, of which seven have two articulations and the last three only one.

The first is the shortest of the whole series with the exception of the last; it is also the broadest.

There is scarcely a sign of an articular process for its articulation with the seventh cervical vertebra, and only a very slightly marked articular surface for the transverse process, both being indicated by a small indentation on the edge of the head of the rib. The second rib has the same flattened form as the first; it is longer, and both articulating processes are better-defined. From the second to the sixth rib, they gradually lengthen, after which they diminish again a little until we reach the tenth, which is the shortest of the whole series. The third, fourth, fifth, sixth, and seventh ribs have all well defined articulating processes and nearly the same form, flattened at and near their head, after which, for nearly one third of their total length, they become more constricted and assume a prismoid shape, after which they flatten and gain again in breadth, their terminal end being, however, narrower. The eighth and ninth ribs, which have only one articulating process for their junction with the transverse process, have the same form as the foregoing if we imagine their heads and necks removed. The tenth rib is flattened throughout; it has also only one articulating surface, and at its posterior end runs out to a point.

The greatest length of each rib, measured in a straight line, is:—

	feet.	inches.
First	1	2·75
Second	1	9·50
Third	2	1·60
Fourth	2	4·10
Fifth	2	4·25
Sixth	2	4·80
Seventh	2	4·60
Eighth	2	3·50
Ninth	2	3·03
Tenth		10·25

Sternum.

The sternum consists of four principal segments, of which the fourth and smallest is separated into a left and a right portion by a division in the centre, which apparently would not have disappeared by ankylosis in a still more aged state of the skeleton.

The first segment is the largest and broadest; it is without a keel, but is well rounded towards the central line. There is a deep excavation in its upper, and a shallower one in its lower portion. Similar excavations exist in the three other segments, by which three fenestra of a rounded shape are formed.

There are five articulating surfaces on each side for the sternal ribs—the first near the upper portion of the first segment, the second at the junction of the first and second segments, the third at the junction of the second and third segments, the fourth at the junction of the third and fourth segments, and the fifth at each side of the fourth segment on its lower portion.

Pectoral Limb.

The scapula is remarkably flat, and without prominent ridges, so that there is scarcely any sign of the postscapular fossa. In form it resembles that of *Mesoplodon sowerbiensis.* The acromion is broad, and has an upward slope in its anterior portion; the coracoid is flat and narrow, but widens considerably at its extremity, where it assumes a prismoid form.

The humerus, ulna, and radius resemble also considerably those of *M. sowerbiensis.* The epiphyses on both extremities are so well anchylosed that scarcely the line of junction can be traced.

The elements of the carpus are, with the exception of the magnum and trapezoid, which are united into one bone, all separate, thus resembling also *M. sowerbiensis* and the New-Zealand *Epiodon*. The same appears to be the case with the digits, which, however, have somewhat suffered, as the pectoral fin had been much lacerated before the skeleton was secured.

Pelvic Bone.

The pelvic bone for the attachment of the crura of the penis is of small size, and of rather irregular form. It is 4 inches long, 0·37 inch broad near both extremities, and 0·25 inch in the middle portion. It is rounded posteriorly and flat anteriorly, getting gradually flatter as we reach the lower end of the bone. It is very light and spongy.

4. Remarks upon Dr. von Haast's Communication on *Mesoplodon floweri*. By Professor Flower, F.R.S.

On comparing the excellent photograph sent by Dr. v. Haast of of the skull of this animal with the type specimen of *M. layardi*, from the Cape of Good Hope, in the British Museum, neither Professor Van Beneden nor myself could detect any differences of the slightest specific importance; indeed at first sight we were inclined to say that the photographs might have been taken from that very specimen. The latter, however, is a trifle larger in all its dimensions, being an inch and a quarter longer; and the teeth are rather more developed, probably the effect of somewhat greater age.

The distinctions upon which Dr. v. Haast relies are chiefly the result of the comparison of the skull with a small figure of *M. layardi* quite inadequate for the purpose, and disappear on more rigid examination. For instance, the proportion of the height to the length of the lower jaw, one of Dr. v. Haast's most telling characters, is really identical, instead of being so widely different as supposed. The habitats of the two specimens, instead of being a reason for separating, would rather, in my opinion, be one for uniting them, as there can be no possible barrier for a Cetacean between the seas of the Cape and those of New Zealand. I am therefore unable, upon the evidence before us, to accept *Mesoplodon floweri* as a well-established species. The great interest of the present communication is that it contains a description of the entire skeleton, and shows that it presents an exceedingly close resemblance to the well-known Northern form, *M. sowerbiensis*.

5. On *Mystacina tuberculata*.

By G. E. Dobson, M.A., M.B., F.L.S., &c.

[Received May 13, 1876.]

There are some important points in the external structure of that most remarkable species of Bat, *Mystacina tuberculata* of New Zealand, which have not yet been noticed, although one writer has occupied four closely printed pages of an octavo book in describing it.

In a paper by Mr. R. F. Tomes, in our 'Proceedings' for 1857, p. 139, a coloured lithograph of this species is given, showing the very peculiar structure of a portion of the wing- and interfemoral membrane near the body; and in the text accompanying it are the following remarks:—"The portions of membrane contiguous to the forearm, the sides of the body, and the tibia are very thick and leathery, with numerous deep wrinkles; and the basal half of the interfemoral membrane (as far as to where the tail becomes free) possesses the same peculiarity. The wrinkles, in many places, cross the legs and forearms, but they are only observable on the upper surfaces of the membranes and limbs. This singular part of the cutaneous system is marked by a regular and decided outline, and can scarcely be said at any place to graduate into the smooth (and very thin) membrane of the wings. Its extent is pretty well indicated by the hairy portions of the membranes in the genus *Lasiurus*, excepting that it only occupies one half of the interfemoral membrane."

No conjectures are hazarded as to the use of this peculiarly thickened and differently coloured portion of membrane, which occurs in this species alone.

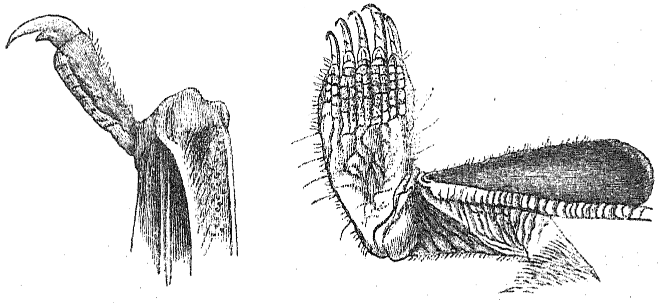
I find that this thickened portion of the wing-membrane is analogous to the thickened portion of the anterior wings in *Hemiptera* and to the elytra of the *Coleoptera*.

Among the many peculiarities of structure presented by *M. tuber-*

culata, none are more remarkable than the presence of a third phalanx in the middle finger, a character in which it differs from all other species of the family (Emballonuridæ) to which it belongs, and agrees with those of a distinct though allied family, the Phyllostomidæ, which are limited to America.

The middle finger consists of a metacarpal bone and three phalanges. The first phalanx, instead of being folded (in repose) upon the dorsal surface of the metacarpal bone (as in the other species of Emballonuridæ) is flexed downwards, inwards, and forwards upon the inferior surface of the metacarpal, carrying with it the corresponding phalanx of the third finger, which lies folded downwards and forwards, between it and the metacarpal bone; the second phalanx is folded backwards on the first; and the third phalanx is folded forwards on the second. Being thus reduced by this peculiar folding process into the smallest possible space, the wing is then tucked in beneath the thickened portion of the wing-membrane margining the forearm and side of the body, which sheaths and completely conceals the whole wing. The posterior half of the interfemoral membrane, from the point where the tail perforates it, is rolled upwards and forwards beneath the leathery anterior half. With the wing- and interfemoral membranes thus encased, this species is the most quadrupedal of Bats; and the peculiar development of the extremities, which I shall now describe, indicates special powers of progression.

Fig. *a*. Fig. *b*.



Thumb and sole of foot of *Mystacina tuberculata*.

The thumb is long, and armed with a large and very acute claw, which has a small talon projecting from its concave surface near the base (fig. *a*); the feet have similarly long and very acute claws; and at the base of each a similar talon is placed (fig. *b*). This peculiar basal talon has not been before observed; and I believe it does not occur in any other species of known Bats. A similar talon is found at the base of the claws in the short-tailed Chameleon, *Rhampholeon spectrum*, which is thus described by Dr. Günther in his description of that species:—"The tail is so short that it can serve as a prehensile organ in a very subordinate manner only. This defect is compensated by the development of an additional sharp denticle at the inner base of each claw, and of a spine vertically projecting from the flexor side of each finger and toe, which must immensely strengthen the power of the animal for holding on to branches, &c." *

The posterior extremities are short, the legs very short and thick; and the outer and inner toes are shorter and much thicker than the others, as in *Nyctinomus*; but they are not fringed with long hairs. The feet are remarkably large, and much rotated outwards and forwards, so as to allow of easy progression. The structure of the sole of the foot and of the inferior surface of the leg is very peculiar, and is well shown in the accompanying woodcut (fig. *b*). The plantar surface, including the toes, is covered with soft and very lax integument, deeply wrinkled; and each toe is marked by a central longitudinal groove with short grooves at right angles to it, as in the genus *Hemidactylus* (Geckotidæ). The lax wrinkled integument covering the sole of the foot is continued along the inferior flattened surface of the ankle and leg.

All these peculiarities of structure must accompany some corresponding peculiarities in the habits of this species. As the denticle at the base of the claw in *Rampholeon spectrum* evidently compensates that animal for the shortness of its tail, which is so effective a prehensile organ in other Chameleons, so I have no doubt the denticle at the base of the claw in *Mystacina tuberculata* compensates that species exceptionally for the imperfect condition of the fore limbs as organs of prehension; and this, taken into consideration with the peculiar manner in which the wings are protected from injury when not employed in flying, and with the manifestly adhesive nature of the sole of the foot and inferior surface of the legs, lead me to believe that this species hunts for its insect food, not only in the air, but also on the branches and leaves of trees, among which its peculiarities of structure most probably enable it to walk about with security and ease.

6. Descriptions of five new Species of Land-Shells from Madagascar, New Guinea, Central Australia, and the Solomon Islands. By Henry Adams, F.L.S., and George French Angas, C.M.Z.S. & F.L.S.

[Received May 29, 1876.]

(Plate XLVII.)

Helix malantensis, n. sp. (Plate XLVII. figs. 1, 2, 3.)

Shell imperforate, trochiform, rather solid, faintly obliquely striated, whitish, ornamented with several broad or narrow fulvous or dark chestnut bands, brown at the base; spire turbinate; whorls

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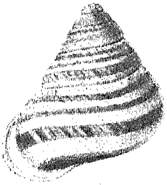
* P. Z. S. 1874, p. 443, with a woodcut.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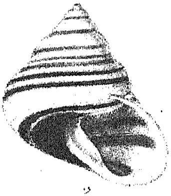
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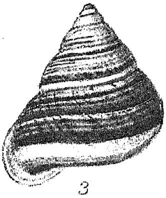
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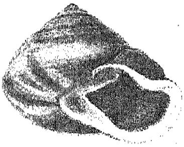
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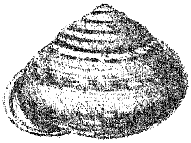
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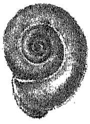
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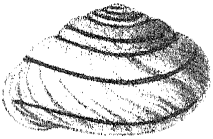
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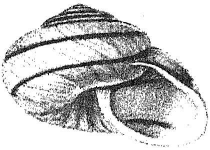
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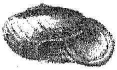
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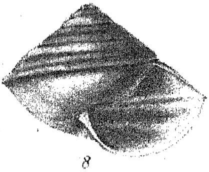
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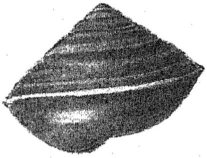
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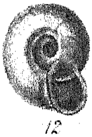
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G.B.Sowerby lith. Hanhart imp.

LAND SHELLS FROM NEW GUINEA,
MADAGASCAR, & AUSTRALIA.

5½, rather convex, the last descending in front; aperture oblique, quadrately lunate; peristome white, margins converging, united by a faint callus, right margin slightly sinuous, a little expanded and reflexed, columellar margin dilated above and a little excavated.

Diam. maj. 25, min. 22, alt. 22 mill.

Hab. Malanta Islands, Solomon Archipelago.

This species differs from *H. guadalcanarensis*, Cox, in being more conical, in the last whorl being less inflated, descending in front, and not angled at the periphery, and in the aperture being smaller, and the outer lip much less flattened and expanded, as well as by the absence of the black margin at the angle of reflexion behind the outer lip, and the purple spot on the columella, and in having the base broadly stained and zoned with chestnut.

HELIX COMRIEI, n. sp. (Plate XLVII. figs. 4, 5.)

Shell imperforate, conically semiglobose, rather solid, rugosely spirally grooved, and obliquely finely striated, opaque, whitish; spire conoidal, obtuse; whorls 4½, rather convex, the last descending, subangulated at the periphery, somewhat flattened at the base, and a little excavated behind the aperture; aperture diagonal, oval-oblong, pale brown within, peristome white, margins converging, united by a thin callus, right margin sinuous, rather expanded and reflexed; columellar margin dilated and appressed.

Diam. maj. 27, min. 21, alt. 20 mill.

Hab. Shores of Huon Gulf, South-east New Guinea.

This interesting species is allied to *Helix brumeriensis*, Forbes, but is rather smaller in size, and without the characteristic black lip of the latter. It was discovered by Dr. Comrie, of H.M.S. 'Basilisk,' after whom we have named it. In the same locality Dr. Comrie obtained several specimens of *Helix brumeriensis*, hitherto known only by the single specimen in the British Museum, collected by the late Mr. J. McGillivray at Brumer Island, during the voyage of H.M.S. 'Rattlesnake,' in August 1849.

HELIX ROBILLARDI, n. sp. (Plate XLVII. figs. 6, 7.)

Shell umbilicated, orbicularly subglobose, rather solid, obliquely striated, whitish, with a pale brown shining epidermis, and ornamented with three very narrow dark brown bands, one being sutural; spire depressedly conical, apex obtuse; whorls 5, moderately convex, the last descending in front and somewhat flattened at the base; umbilicus open, funnel-shaped; aperture diagonal, truncately oval, pale brown within; peristome with margins approximating, united by a thin callus, the right margin slightly flexuous, expanded, and a little reflexed; the columellar margin thickened, reflexed, and dilated above.

Diam. maj. 32, min. 27, alt. 20 mill.

Hab. South-west Madagascar (*Coll. Sir D. Barclay*).

HELIX FENERIFFENSIS, n. sp. (Plate XLVII. figs. 8, 9.)

Shell narrowly umbilicated, depressedly trochiform, carinated, very thin, subpellucid, shining, pale olive-green, finely obliquely striated throughout and decussated above with very minute concentric rugose striæ: spire conical, apex obtuse; whorls 6, nearly flat, the last not descending in front, inflated below; aperture diagonal, large, angularly elliptic; peristome thin, simple; columellar margin slightly reflexed over the umbilicus.

Diam. maj. 33, min. 27, alt. 24 mill.

Hab. Feneriffa Islands, North-west Madagascar (*Coll. Sir D. Barclay*).

HELIX EYREI, n. sp. (Plate XLVII. figs. 10–12.)

Shell widely umbilicated, subplanorbular, rather thin, obliquely striated, and under the lens minutely granulated, light brown, pale below; spire flattened; whorls 5, a little convex, the last rounded and slightly descending; aperture oblique, lunate; peristome flesh-coloured, margins approximating, thickened, and slightly expanded.

Diam. maj. 17, min. 14½, alt. 6½ mill.

Hab. Shores of Lake Eyre, Central Australia.

This is another species of the peculiar discoidal group of Helices (*Angasella*, A. Ad.) from the arid regions of Central Australia, to which *H. cyrtopleura*, Pfr. and *H. phillipsiana*, Ang., also belong.

EXPLANATION OF PLATE XLVII.

Figs. 1–3. *Helix malantensis.*
4, 5. —— *comrici.*
6, 7. —— *robillardi.*
8, 9. —— *feneriffensis.*
10–12. —— *eyrei.*

7. Notes on the Birds of the Navigators' and Friendly Islands, with some Additions to the Ornithology of Fiji. By E. L. LAYARD, C.M.G., F.Z.S., &c., H.B.M. Consul at New Caledonia.

[Received May 24, 1876.]

Recent visits to the Navigators' and Friendly archipelagos having enabled me to extend my knowledge of the avifauna of these two groups of islands, so intimately connected with the ornithology of Fiji, I offer the accompanying remarks for publication in the Proceedings of the Society as a sequel to my 'Notes on Fijian Birds' (P. Z. S. 1875, p. 423).

I will take first in order the Navigators', and give a list of the known species, commenting on them as I proceed.

1. STRIX DELICATULA, Gould.

This Australian White Owl is common throughout the islands, and is the only Raptorial bird known on them. I frequently put it up from among the cotton-bushes planted in rows between the cocoa-nut trees; and it seemed not to be affected by the glare of the daylight. It feeds on lizards, beetles, &c.

2. CORIPHILUS FRINGILLACEUS, Gm.

Abundant in the early morning before the sun gets hot, on the flowers of the cocoa-nut trees, sipping the sweetened dew caught in the freshly opened spathes. When this is dried up by the heat, they are off to the forest, and feed on some of the many-petaled flowers of the tall trees. During the time that the "coral trees" (*Erythrinæ*) are in flower, they may be shot in dozens, as these trees form their favourite resort.

I have procured specimens of this lovely little Parrakeet from the island of Futuna; and they are very abundant on Vavaw, the most northern of the Friendly Islands.

3. EUDYNAMIS TAITENSIS, Sparrm.

I saw a single specimen of this Cuckoo in December, and was informed by a gentleman collecting for Messrs. Godeffroy, of Hamburg, that they are not uncommon.

4. HALCYON PEALEI, F. & H.,

is confined to the island of Tatuila, which, unfortunately, I was unable to visit. In Samoa it is replaced by

5. HALCYON RECURVIROSTRIS, Lafr.

which is tolerably common in the more open parts of the forest, in the clearings and native gardens. It usually sits perched on a dead, protruding branch, on the look-out for insects (*Gryllæ*), after which I have seen it dart like a Flycatcher, hovering in the air and returning to its post of observation. It also darts at *Cicadæ* sitting on the trunks and branches of trees, off which it seizes them with unerring aim.

6. COLLOCALIA SPODIOPYGIA, Peale.

One of the commonest birds in Samoa, skimming about the open country, or amid the cocoa-nut groves, with equal facility.

7. MYZOMELA NIGRIVENTRIS, Peale.

I did not find this lovely little "Sugar-bird" at all plentiful; those I saw were chiefly on the flowers of the Banana.

8. PTILOTIS CARUNCULATA (Gm.).

Drs. Finsch and Hartlaub are, I think, in error in figuring this bird with a *white* iris, and describing it "iride alba." I have now shot a fair number in Loma Loma, in Samoa, in Tonga Tábu and Vavow; but in not one was there the least approach to a *white iris*; brown, or ashy brown was the colour in all of them. It is very common everywhere; and in the early morning, before sunrise, when the country rings with its loud notes, as a friend observed, "it is the nearest approach of any to a song-bird! he is trying to be a thrush!" It clings in any position to the flowers that conceal its favourite food (small insects), and is very pugnacious, driving away from the feast any bird that attempts to share it.

9. Leptornis samoënsis, Hombr.

Found in small flocks in the forests of Samoa, seldom approaching the coast, where, however, I was fortunate enough to meet with it and secure nice specimens. It has a loud flute-like call, and clambers about the topmost branches of the tallest forest trees. When held head downwards, a plentiful discharge of honey escapes from the bill, and the stomachs of those dissected contained insects, bits of leaves, &c.

10. Tatare longirostris (Gm.).

I sought for this bird in vain, both in Samoa and Tonga; and all my inquiries proved equally fruitless; no one knew of such a bird. The Rev. Mr. Whitmee also, who has devoted considerable attention to the zoology of the Navigators' Islands, doubts its being an inhabitant of them. It may have become extinct, like a species I shall have to allude to from Tonga; but the natives have no name for it.

11. Petroica pusilla, Peale.

This pretty little "Robin" is not very uncommon in the woods in Samoa, and is generally found in pairs, ♂ and ♀, or with the addition of their young family. It is bold and fearless, and admits of a close approach, being usually perched on the undergrowth of young trees. Feeds on small insects, ants, &c.

12. Turdus vanicorensis, Quoy.

This "Blackbird" might be easily mistaken for our English friend, both when hopping about the ground, probing for worms, or when speeding through the coppice, uttering its shrill metallic cry of alarm. Several times, when darting from some thick bush, it flew down the roads cut through the cocoa-nut plantation. When I saw it most abundantly, I could not help fancying myself again for the moment in some Staffordshire lane, where, as a boy, I chased them with loaded ash sticks!

I saw eggs in Mr. Whitmee's possession closely resembling those of the English bird, and gathered from him that the nest was also similar.

The acquisition of this bird revealed to me the fact that our Fiji bird is quite distinct, and of a new species, which I have therefore described under the title of *Turdus vitiensis*, Ann. N. H. 4 ser. vol. xvii. p. 305; and since I returned, the same kind friend to whom I am indebted for it has found another species in Taviuni, which I have had much pleasure in naming after him, *T. tempesti* (*antè*, p. 420). This, with the Kandavu bird (*T. bicolor*, Ibis, 1876, p. 153), makes three species of this genus peculiar to Fiji; and I doubt not others yet remain to be found in the centre of the large island Viti Levu.

13. Rhipidura nebulosa, Peale.

Not rare in the forest, and about the cotton-bushes on the plantation before named. It did not spread its tail, or make such noisy demonstrations as the Fijian *R. albicollis*, perhaps because my visit to its haunts was not made during the breeding-season. I was informed that the nest was of the true *Rhipidura* type, with a long pendent base.

A fine *Rhipidura* has been added to the avifauna of Fiji, procured at Kandavu, by my old servant Charles Pearce. Mr. Ramsay, of the Sydney Museum, alludes to it as *R. personata*.

14. Myiagra albiventris, Peale.

This pretty little flycatcher takes the place, in Samoa, of the Fijian *M. castaneiventris*, but is not so plentiful; nor does it so much affect native villages and gardens, being more restricted to the forest. The sexes, unlike ours, are hardly distinguishable. A young bird (still tended by its parent) shot by me on the 18th December, almost exactly resembles the young of *M. castaneiventris* shot in October, being dark slate-coloured above, with a dirty buff throat, and whitish abdomen and vent.

This species feeds exclusively on insects, which it seeks on the leaves or on the wing, the snap of its bill being audible to a considerable distance.

15. Pachycephala flavifrons, Peale.

If the description given by Finsch and Hartlaub is correct, neither Mr. Whitmee nor myself have succeeded in identifying this species. The only *Pachycephala* known to us has certainly not got "*guttur album*." A fine male is *yellow* on the throat, slightly *dirtied* with a dark grey, which condenses to a near approach to black on the chin. The nostrils are covered by a yellow patch; but this is not noted in the description. A young male, shot on the 22nd December, has all the chin, throat, and chest grey, and shows traces of rufous on the flanks, vent, under tail-coverts underneath, and on the wing, secondaries, and cheeks above. It wants also the yellow nostril-patch. The female (unlike those of all the species known to me in Fiji, which are rufous) is also yellow below, the grey of the throat and chin being tinged with the same, no nostril-patch.

This bird is not uncommon in Samoa, and, in addition to the sexual difference noted before, is dissimilar to any *Pachycephala* I have yet seen, in its choice of locality, and want of voice. Our Fijian birds, (as also *P. jacquinoti* of Vavaw), never approach cultivation, but keep to the genuine forest; the Samoan species, on the contrary, comes down to the cocoa-nut groves and native gardens, and is a quiet bird, the others being constantly on the move, uttering their loud calls.

16. Pachycephala albifrons, Peale.

This bird did not occur to me; nor has Mr. Whitmee recognized it; indeed, *in epistolâ*, he entirely doubts the habitat.

I should here correct an error I have fallen into in my "Notes on

Fijian birds" (P. Z. S. 1875). The description under the head of *P. graëffei* (p. 433) applies to *P. icteroides*; and that under *P. vitiensis* should be coupled with the latter part of *P. torquata*, under the head of "*P. intermedia*, Layard, sp. nov."

P. icteroides, Peale, differs from *P. graëffei* in being of a much *lighter yellow* (the other is *orange*), and in having the nostril-spot much fainter; indeed in some it is altogether wanting. The female shows still greater differences: that of the first is deep rufous (almost chestnut); of the latter, brown with grey-mottled throat and pale buff underparts.

This species is said to occur in Samoa (Orn. Centr.-Pol. p. 76); and a native name, "Vasavasa," is given for it. This, however, is the name applied to the species before alluded to by me; and, as I have already stated, only one species is known to us from Samoa.

P. graëffei, Hartl., is, as far as I yet know, confined to the neighbourhood of Bua, on Vanua Levu; and a single female has reached me from Rambi Island, to the north of Taviuni.

P. intermedia, Layard, is intermediate between my *P. torquata* and *P. icteroides*, Peale. It is light-coloured, like the latter, and has only a *very narrow* black collar. It has been killed on Ovalau, and on the big island of Viti Levu opposite Ovalau.

P. vitiensis, G. R. Gray, ♂, has also a *narrow black* collar, but may at once be distinguished from all the others by the *pure white throat and chin*. The female is reddish brown below; cheeks chestnut; top of head brown, back tinged with green; quills brown edged with rufous. As yet it has only occurred to me from Kandavu, the southernmost island of the Fijian group.

17. Lalage terat, Bodd.

Very common in Samoa, feeding much on the ground in the gardens attached to the European houses, as well as the native plantations. This habit I never observed in the Fijian bird, which appears to me less highly coloured than the Samoan. In December there were lots of young ones about, being fed by their parents. A most interesting specimen in this stage occurred to me: it is white beneath, with confused wavy grey bars, above pale brown, each feather being edged and tipped with white. Bill bright yellow.

18. Aplonis brevirostris, Peale.

Common throughout the island of Samoa. Feeds much on a small dark purple berry that grows in dense clusters on a fair-sized tree. These birds decompose very quickly; I was always obliged to skin them the first on my return home, or all the vent-feathers came off.

19. Sturnoides atrifusca, Peale.

It is singular this fine Starling should be confined to the Navigators' and not found in the Friendly Islands or Fiji. It was the first bird I saw on landing at Upolu, and involuntarily I exclaimed a "Spreo!" so exactly did its appearance, and flight, remind me of the South-

African *Lamprotornis bicolor*! It often goes in little flocks, and feeds much on the same trees frequented by the preceding, and also on a larger berry much patronized by the "Green Doves" (*Ptilonopus*). It also devours insects, and is subject to the same rapid decay as *A. brevirostris*.

20. ERYTHRURA CYANOVIRENS, Peale.

I obtained this pretty little Finch among the cotton-plants; but it was rare. It feeds on minute seeds. The young bird is furnished with small caruncles at the base of the bill, and has been made into a new genus by Drs. Finsch and Hartlaub, under the name of *Lobiospiza notablis* (P. Z. S. 1870, p. 817). The young of the Fijian bird (*E. pealei*, Hartl.) possesses similar appendages. My son has just procured it at Suva, on Viti Levu; and we got it in some plenty at Ngila, on Taviuni, in the forest, feeding on high trees bearing berries.

21. PTILONOPUS PEROUSEI, Peale.

On one tree (a species of *Ficus*) in the forest at the back of Upolu, I saw at least thirty pairs of this lovely little Dove, in all stages of plumage, some of which I obtained.

22. PTILONOPUS APICALIS, Bp.

Mr. Whitmee (*in epistolâ*) informs me that the bird designated by this name is nothing more than the female of the preceding. Drs. Finsch and Hartlaub also, in their 'Ornithologie,' place a mark of doubt (?) before it. Great therefore was my astonishment when a live bird was brought on board H.M.S. 'Nymphe,' which I at once detected was quite distinct from our Fijian bird, and agreed very well with the description in the 'Ornithologie' of *P. apicalis*. Subsequently I obtained the loan of the 'Journal des Mus. Godeffroy.' In Heft 1, Tafel 7. No. 2 professes to be a figure of *P. fasciatus*, but has evidently been taken from a Samoan bird, and consequently represents *P. apicalis*. The deep orange of the vent and under tail-coverts, (so different from the pale yellow of the Fijian *P. fasciatus*), is well shown, as is also the bright yellow tip to the tail. This in *P. fasciatus* is dull grey, and does not extend to the end, the extreme tip being *green*. The chestnut on the abdomen (*entirely wanting in the Fijian bird*) is hardly dark enough, or bright enough; and the black indistinct line which exists at the superior edge of the same is not given; nor is the pale yellow patch from the chin along the centre of the throat. The magenta colour of the head is not dark enough; but this is clearly a mistake of the colorist. Another marked difference remains to be noted, the lovely *blue-green tips* to the wing-secondaries of *P. fasciatus* are changed in the Samoan bird to a still more lovely bright lilac! and the blue-black patch on the abdomen of the former is changed into an exquisite dark magenta. I now fancy the figure, pl. xi. of the 'Ornithologie,' must have been taken from a Samoan bird (see *antè*, p. 436).

I found *P. apicalis* abundant, feeding on various wild berries, some even on the low cotton-bushes, the voice a pleasing melancholy rolling coo, like that of its Fijian congener. Many young birds, assuming the magenta head, were obtained; the females are not so brightly coloured as the males, especially on the under tail-coverts; very young birds have the whole of the underparts "scaly" (maillé) with yellow edges to their green feathers; the wing-feathers are also broadly edged and tipped with fine yellow. They show no trace of the V-shaped termination of the breast-feathers, one of the characteristics of the genus; nor is the apical termination of the first primary so attenuated.

23. Columba vitiensis, Quoy.

A mutilated specimen brought me by a native appeared to be similar to our Fijian bird; and Mr. Whitmee informed me that he believed

24. Columba castaneiceps, Peale,

to be founded on the young of this species. They are not common.

25. Carpophaga pacifica, Gm.

Very abundant, and the sexual organs and knob on the bill of the male much developed in December.

26. Phlogœnas stairi, Gray.

Rare; only one specimen fell under my notice. Mr. Krause (Messrs. Godeffroy's collector) told me they had periodical migrations, and were sometimes plentiful. This bird is said to nest on the ground.

27. Didunculus strigirostris, Jard.

I did not myself see this bird in its haunts; but one was shot not far from where I happened to be, and I had the pleasure of skinning it. I had a native out in search of these birds for three days; but he failed to obtain any.

28. Megapodius stairi, Gray.

Mr. Whitmee and Mr. Krause both assured me no Megapode exists in the Navigators' Islands. Mr. Whitmee affirmed that the bird on which the species was founded was brought from Ninafoo by the Rev. W. Stair, and transmitted to England among some Samoan skins; hence the mistake. When I recollect that my late old friend Mr. G. R. Gray fathered on me the habitat of Ceylon for *Larus hemprichii*, because I gave the British Museum specimens shot at Aden on my way from the former place (among a number of Ceylonese birds), I don't wonder at the mistake!

29. Rallus pectoralis, Less.

Very abundant, running about wet places like rats, and preferring to trust for safety to their heels rather than their wings.

30. Ortygometra quadristrigata, Horsf.

31. O. tabuensis, Gm.

Neither of these birds occurred to me; but I heard that the latter was not uncommon. The former has been obtained in some abundance in the interior of Viti Levu, where it seems to displace the smaller *O. tabuensis*. Eggs said to be of this species are pale drab colour, profusely covered with reddish-brown ill-defined minute marks; axis 1″ 2‴, diam. 11‴. Six in one nest.

32. Porphyrio vitiensis, Peale.

How the mistake could have occurred of identifying the Samoan with the Indian bird, I cannot conceive. A comparison of the two must instantly dispel the illusion. This Gallinule is very common here as in Fiji and Tonga.

33. Limosa uropygialis, Gould.

Generally distributed, with the next species, along the sea-coast; but I could not hear of its being found in the breeding-plumage.

34. Actitis incana, Gm.

Not very plentiful where I was, but always obtainable at low tide.

35. Charadrius fulvus, Gm.

Very common, and tame, feeding on the grassy paddocks close up to the houses.

36. Strepsilas interpres, L., non vidi.

37. Ardea sacra, Gm.

Not common, but generally distributed.

38. Anas superciliosa, Gm.

Rare and local, being only found on the lakes in the mountains—old extinct craters, in fact.

39. Sterna bergii, Licht.

Little or nothing appears to be known about the sea-fowl of this group. Drs. Finsch and Hartlaub do not enumerate one single Tern from here! I recognized *S. bergii*.

40. Sterna melanauchen.

41. Sterna panaya.

42. Anous stolidus.

43. Anous leucocapillus.

44. Gygis alba, Sparrm.

Of these five Terns, the first I obtained in full breeding-dress and *στοργὴ* at Levuka in the end of January; the second my son shot in some plenty on the reef opposite Levuka in November, in splendid plumage, the whole body being suffused with such a pink blush as the loveliest woman in the world would covet for her cheek; the fifth must also be added to the Fijian fauna, as it is found among the islands to windward. I had often, in my cruises, noticed a large "Noddy," but only obtained it lately on my return from Samoa, when one was thrown on board, off Vatoa (Turtle-Island), during a hurricane, into which I was unfortunate enough to stumble. But "it is an ill wind that blows nobody luck;" it gave me *A. stolidus*, and very nearly a splendid specimen of *A. leucocapillus*; so these two must now certainly be included in the Fijian lists.

45. Thalassidroma lineata, Peale.

I saw a small petrel off Upolima, which was doubtless this species; also a large dark petrel which I fancied must be

46. Procellaria cærulea,

or what serves for it in these seas.

47. Procellaria —— ?

Just before my arrival a native had caught, in his workshop, a large Petrel, which he brought to Mr. Whitmee. I could not identify it, not having any descriptions; it however reminded me of *P. macroptera*, Smith.

My Notes on Fijian Birds must here be amended. *P. cerulæa*, as described by Drs. Finsch and Hartlaub, is found breeding in the mountainous parts of severul of the Fijian Islands, even as far inland as the interior of Viti Levu. It sweeps the seas in storm or calm, in company with the next and another larger species of *Procellaria*, not yet obtained, probably No. 47. *Puffinus nugax* also breeds in the interior, both digging holes and living in "rookeries." I have obtained specimens of both, and can only say that *P. cerulæa* differs much from what we identified with *P. cærulea* at the Cape.

48. Phaëton rubricauda, Bodd.

49. Phaëton æthereus, L.

50. Phaëton candidus, Gray.

These three Tropic birds are found among the Navigators' Islands. The last builds in the forests of Samoa, selecting as a site for its nest the fork of a tree or of a huge perpendicular branch, so that it can enter at one side and avoid bending or damaging its long tail! I used to watch the flocks going to their sleeping-quarters in the woods passing high overhead; and we soon observed that great numbers of them were devoid of tails; one I obtained proved to have moulted this appendage.

51. Dysporus sula, L.

I saw "Gannets" about the Samoan seas, but not near enough to distinguish the species. This species is given as an inhabitant by Drs. Finsch and Hartlaub.

52. **Tachypetes aquilus**, L.

Common in stormy weather.

Though the number of species is smaller in the Navigators' Islands than in Fiji, being 52 as compared with 98, the number of individuals is apparently far greater. I could any morning, within one mile of the town of Upolu, shoot twenty or thirty birds, of at least ten species, in the course of a couple of hours. Here in Fiji, in the best collecting-ground, we considered eighteen or twenty specimens a good day's work, from daylight till one or two o'clock; and we might perhaps have six species, if we were lucky!

We were in Samoa at the worst time of the year, the rainy season: all the birds were moulting; and the young of the last season had not assumed their full nuptial dress. Mr. Krause assured me I could have obtained double or treble the number in the fine season, especially when the *Erythrina* blossomed. Its flowers are a great attraction to insects, and consequently to most of the birds.

I fancy that there are still other species to be discovered in the group. Dr. Gräffe does not seem to have been an assiduous collector, or he could not have missed so many novelties in Fiji. Perhaps Mr. Kleinsmith, the present collector for Messrs. Godeffroy, may prove more industrious; he has already done good service by discovering the curious little *Lamprolia minor*, and procuring additional examples of my new species.

On the 12th of February I found myself in Tonga-Tabu; and as soon as I could spare time from my official work (the object of my visit) I took a stroll in the country to inspect the birds of that part of my consulate. Few and far between were they. The little *Collocalia*, as usual, thrust himself first into notice; and I eagerly scanned them as they glided by to detect *C. vanicorensis*, but in vain. Then the "Wattle-birds" (*Ptilotis*) claimed my attention; and I fear I shot more than I could skin, to look for one with a *white eye*; none showed that peculiarity. Then *Lalage terat* appeared on the scene in considerable numbers. I was surprised at this, as it is not included in Drs. Finsch and Hartlaub's list. The last bird I shot was *Aplonis tabuensis*; and the instant I picked it up I saw that our Fiji bird differed from it, and had been wrongly associated with it. If, then, none of the synonyms given to *A. tabuensis* can be traced to a Fijian-killed bird, I propose for our species the name of *A. vitiensis*; and the bird I have described from the island of Futuna being identical with the Tongan species, the name given to it by me must sink into another synonym of that already overburdened species.

To proceed symmetrically, however, I commence with

1. **Haliaëtus leucogaster**, Gm. (?)

A solitary specimen of this bird may have reached Tonga; but all my inquiries respecting Raptorial birds only elicited the fact that our two Fijian hawks occasionally visit the group, and are recognized as stragglers by the Tongans, who of course, knowing them well, call them "Fiji Hawks." Some of the white residents were also aware of their occasional presence; I therefore include them in the Tongan list, provisionally, with a mark of doubt.

2. ? Astur cruentus, Gould.

3. ? Circus assimilis, Jard.

Occasional visitants. This reminds me that a straggler has turned up in Fiji, and must be added to our list. It was shot on the Rewa by Mr. Storck, and has passed into the possession of Baron von Hügel, who, I believe, identifies it as *Falco lunatus*. I have not seen it.

4. Strix delicatula, Gould.

The only resident bird of prey in this group. Common everywhere.

5. Platycercus tabuensis, Gml.

In answer to my inquiries after birds, I was always comforted with, "Ah! you should get the black parrot of Eooa!" and I confess my curiosity was greatly excited. However, as I was bound to Eooa on duty, I confidently expected to get it, and charged all my messmates in H.M.S. 'Nymphe' to shoot every parrot they could see!

This Eooa (or E-u-a) is a small island to the south of Tonga Tabu. It appears to me to be a mass of coral, metamorphosed, by the action of volcanic heat under great pressure, into crystallized limestone. It has then been raised to a considerable height (compared with Tonga Tabu its near neighbour) above the sea-level, and, having cracked in cooling, is traversed by numerous deep perpendicular fissures. In these flourish a luxuriant tropical vegetation, while the gently rising surface of the island itself is covered with rich grass, on which are depastured some ten or fifteen thousand sheep. As the forest has encroached in places on the pasture-land, the island, viewed from the higher levels, appears like a most beautiful park, and it has the reputation of being the "loveliest island in the South Seas."

I had to visit one of the stations; so, arming myself with "Long Tom," and handing my large double "Westly Richards" to a native, I sallied out, determined to get a "black parrot" if possible. I also specially hired a native to go in search of them, and shoot nothing else.

In one of the deep fissures I heard the undoubted "ka ka" of a parrot, that sounded vastly like that of our Fijian bird; so, while I kept watch for a flying shot, I sent the native down the perpendicular sides. Presently I heard below me the loud report of my big "ten-bore," followed by the native's shout of triumph; and he shortly reappeared, bringing me my old friend *Platycercus tabuensis*.

Here, then, was a surprise! the "black" parrot turns out a dark maroon; and here, on this speck of land, and *only on it*, appears a Fijian Parrot!! The more I think over it, the more I am convinced that the bird has been introduced into Eooa *artificially.* I have already (Ibis, 1876) described the varieties of this species and *Pl. splendens,* Peale. It will be seen that *Pl. tabuensis* and its allies inhabit that part of Fiji to which the Tongans have long years ago had free access. They and the Samoans are specially partial to red feathers for trimming their fans, &c., and for this purpose keep our little *Lorius solitarius* in confinement, plucking it twice a year. I was told they fetched as high as 20 or 30 dollars a pair in Tonga, to which place, and to Samoa, they are conveyed by every canoe or vessel that leaves these islands. What more likely, then, that some Tongan (a chief probably) took with him the form of *P. tabuensis* found in Vanua Levu, and either purposely or accidentally let it loose in Eooa? It could never fly thither of its own accord; its powers are too limited; and not one representative of the genus is found anywhere among the islands. No! it must have been introduced*.

At Vavaw I heard of a "small parrot with two long feathers in its tail" which formerly existed in the group, but has become quite extinct.

6. CORIPHILUS FRINGILLACEUS, Gm.

This lovely little bird is very abundant on Eooa and Vavaw, but is rare on Tonga Tábu; at least so said the Missionaries. Native name "Kohanga."

7. EUDYNAMIS TAITIENSIS, Sparrm.

I could hear nothing of such a bird; but it probably exists there.

8. HALCYON SACRA, Gm.

9. H. VENERATA, Gm.

I shot a whole lot of Kingfishers to find *H. venerata,* but, I fear, without succeeding in my object. I however observed that the bills in the Tongan birds were shorter than ours, and that full-plumaged males never assumed the fine chestnut colours of our bird.

10. COLLOCALIA VANICORENSIS, Quoy.

11. C. SPODIOPYGIA, Peale.

The latter is very common; the former I could not detect.

12. PTILOTIS CARUNCULATA, Gm.

The commonest bird in the group, native name "Fule-haio."

13. TATARE LONGIROSTRIS, Gm.

No such bird known to any one in the group, and no native name for it. Has it too become extinct?

14. MONARCHA NIGRA, Sparrm.

This bird has undoubtedly become extinct. Large sums have been offered by Messrs. Godeffroy's collectors for the acquisition of a single specimen, but in vain! The *very* old natives say they remember the bird, and call it "Moho."

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* Cf. Sclater, *suprà,* p. 308.—ED.

15. Pachycephala jacquinoti, Bp.

This fine Flycatcher is found only on Vavaw, and confines itself to the forest, wherein its loud call betrays its presence to the ear, though it seldom meets the sight, unless cautiously sought for. I could call them to me by imitating the note, and obtained three adult males, three young males, and three adult females. The assistant-surgeon, also, of the ship, who has begun collecting birds, obtained a pair of adult birds, male and female, the morning of our departure. Its call is not unlike that of *P. torquata*, ending with a short, snapping note. The females, unlike those of our Fijian *Pachycephalæ*, are clear yellow below, with a buff-coloured head, throat, and chest. They frequented the high timber as well as the undergrowth, searching for minute insects, at which they darted while at rest on the underside of leaves or branches; native name "Kho." As an addition to the fauna of Fiji, I give descriptions of the egg and nest of *P. torquata* obtained by Mr. Tempest in Taviuni.

Egg palish blue-green, densely spotted with large black spots, in the form of a ring, at the obtuse end, and sparsely over the rest of the surface. Axis 1″ 2‴, diam. 9‴.

Nest, a coarse structure of rootlets, covered with dead leaves, fastened with spiders' webs, placed in a bush on a thin twig, and supported by a horizontal branch of dead wood, evidently placed for the purpose. External diam. 4″, internal 2½″; internal depth 2″.

16. Lalage terat, Bodd.

Sigīviu of the natives. I obtained an egg of this bird from a little English lad on Eooa. It is pale blue, sparsely but generally spotted with dark purple-brown spots, rather large. Axis 1″ 2‴, diam. 9‴.

17. Aplonis tabuensis, Gm.

As before stated the true *A. tabuensis* differs from our Fijian bird, which is much lighter below, with the white markings down the shaft of each feather much broader and more developed, and the light chestnut of the belly and under tail-coverts brighter and clearer; over the whole of the upper plumage likewise, especially on the head, there is a fine *coppery* glance, which, in the Tongan bird, is changed to an *iron* glance. It is not such a robust bird; and the bill is decidedly smaller. I propose for it the name of *A. vitiensis*. The Tongan bird is found on Futuna Island.

18. Ptilonopus perousei, Peale.

A rare visitant to the Tonga group. I did not see it.

19. Ptilonopus porphyraceus, Forst.

This "green dove" is not uncommon, and is decidedly intermediate between our *P. fasciatus* and the Samoan *P. apicalis*. It has the orange under tail-coverts of the latter, but wants the dark chestnut marking on the abdomen, being here more like the former. A fine breeding male has the black abdominal patch shaded away into brilliant purple. The spots on the secondaries also resemble in colour those of *P. fasciatus*. A *Ptilonopus* from Futuna Island agrees precisely with this bird.

In habits it resembles its brethren, and is called by the natives "Kullu Kullu." A female in full breeding-plumage resembles the male, but is not so brilliantly coloured on the abdomen.

20. CARPOPHAGA PACIFICA, Gm.

Common throughout the group; native name "Oroobe."

21. MEGAPODIUS BURNABYI, Gray.

No Megapode is found in the group, according to the testimony of the whites, who, however, know the Ninafoo bird well.

22. PORPHYRIO VITIENSIS, Peale.

Though not given as an inhabitant of these islands by Drs. Finsch and Hartlaub, I obtained this species (or saw it) on Tongatabu, Eooa, and Vavaw.

23. LIMOSA UROPYGIALIS, Gould.

Was shot by our party, both on Eooa and Tongatabu.

24. ACTITIS INCANA, Gm.

Same as preceding.

25. CHARADRIUS FULVUS, Gm.

Very common, especially on the uplands of Eooa.

26. STREPSILAS INTERPRES, L.

Not mentioned by Drs. Finsch and Hartlaub, but very common. I saw a large flock of at least forty, showing all stages of plumage; one I shot was just assuming the nuptial dress.

27. ARDEA SACRA, Gm.

Very common, most of those shot were just assuming the full white plumage, a few blue feathers appearing here and there.

28. ANAS SUPERCILIOSA, Gm.

Common both on the sea-shore and in the lagoons.

29. STERNA GRACILIS, Gould.

Given by Drs. Finsch and Hartlaub as found in Tongatabu. The species we saw were:—

30. STERNA BERGII, Licht.

31. STERNA MELANAUCHEN, Temm.

32. Sterna panaya, Gm.

These were all common in the harbour at Tongatabu, the last being in specially fine plumage.

33. Gygis alba, Sparrm.

A few of these were killed on Tongatabu; but on arriving at Eooa I found the ravines full of them, and so tame that they would almost perch on the gun-barrel, if it was held out. The officers of the ship made the same observation on their tameness at a lagoon in Vavaw. They perch constantly on trees; but for what purpose I could not ascertain; the stomachs of six I shot were entirely empty. The lovely blue tints at the base of the bill fade soon after death.

34. Anous stolidus, L.

35. Anous leucocapillus, Gould.

The former I saw at sea, off the islands; the latter was common even in the harbour. Petrels were also seen.

36. Phaëton rubricauda, Bodd.

37. Phaëton æthereus, L.

38. Phaëton candidus, Gray.

All the *Phaëtontes* were observed about the islands. At Eooa I obtained an egg, said to be of the latter, which is called by the natives "Tavaki."

39. Dysporus piscator, L.

40. Dysporus sula, L.

41. Tachypetes aquilus, L.

Gannets were seen from the ship when near land, but none obtained. Frigate-birds hovered over our mast-heads, and tempted Captain Suttie to two or three shots, in the hope of procuring me a specimen; but their small bodies, at the great altitude they always maintained, escaped the shot.

These seas, as a rule, are very destitute of birds. If any are seen, it is a sure indication that land is not far off. The "Frigates" and "Phaëtons" approach the ship, while the "Noddies," "Petrels," and "Puffins" keep at a respectful distance, and can only be identified through my faithful companions my binoculars. A little practice enables one to do this with tolerable certainty; there is sure to be some marked peculiarity by which, if the bird is once fairly identified, it can always afterwards be recognized.

Carefully made collections from each of the numerous small islands dotted over these seas would, I am convinced, exhibit some interesting facts in the distribution and variation of species. The volcanic islands especially would afford a fine field for scientific investigation, in connexion with the distribution of the Megapodes, as they seem to be confined, more or less, to them.

Captain Suttie informed me that on Savo (Solomon Islands) he found the sea-shore divided into "paddocks" by stone walls, having no enclosure at the back, which led into the bush. These belonged each to an individual, or a family; and no one poached on his neighbour's ground. The Megapodes came down to the beach to lay their eggs in the sand, merely scratching a hole like that of a rabbit, and leaving it open after them. All eggs found in these enclosures belonged to the owner of the plot of ground. The birds *made no nest, or mound, of any sort*. Captain Suttie took some eggs on board; and they hatched in a box in his cabin! They fed on minute insects which they found in the sand brought on board with them, which they turned over continually; when these failed they died.

I have to make the following additional emendations on my "Notes on Fijian Birds" (*anteà*, p. 423 *et seq.*).

A new Parrakeet must be added to the list, TRICHOGLOSSUS AUREOCINCTUS, mihi, found in various places, chiefly Taviuni, Viti Levu, and Ovalau.

EUDYNAMIS TAITIENSIS, Sparrm.

My son and I obtained this Cuckoo on Wakaia, and saw several specimens, in the middle of September last.

HALCYON CASSINI, F. & H.

I cannot satisfy myself of the distinctness of this species from *H. sacra*. I do not think more than one form of *Halcyon* is found in Fiji; but they differ much at different ages; the sexes also differ.

PTILOTIS PROVOCATOR, Layard.

The egg is pale salmon-colour, generally speckled, but chiefly at the obtuse end, with largish spots of dark brown and indistinct purple. Axis 1″, diam. 1½‴.

TURDUS VANICORENSIS, Quoy et Gaim.,

has not been found in Fiji. We however, possess three true "Blackbirds":—*T. bicolor*, Layard, from Kandavu; *T. vitiensis*, Layard, from Bua; and *T. tempesti*, Layard, from Taviuni. I expect others will turn up in Viti Levu.

ORTYGOMETRA QUADRISTRIGATA, Horsf.

Inhabits the mountainous interior of Viti Levu.

STREPSILAS INTERPRES, Linn.

Shot on Koro by my son.

STERNA MELANAUCHEN, Temm.

Several have been shot by my son, on the reef at Levuka.

PUFFINUS NUGAX (Solander).

PROCELLARIA CÆRULEA, Gm.

Both species breed in the mountainous parts of the islands; and my son obtained a specimen of the former, swimming on the Rewa river.

PHAËTON ÆTHEREUS, L.

PHAËTON RUBRICAUDA, Bodd.

PHAËTON CANDIDUS, Gray.

I have positively identified these three *Phaetontes* as inhabitants of these islands.

DIOMEDEA MELANOPHRYS.

Baron von Hügel testifies that he saw this bird within sight of Kandavu; it may therefore claim a place in our avifauna.

8. On some Anatomical Characters which bear upon the Major Divisions of the Passerine Birds.—Part I. By A. H. GARROD, M.A., F.Z.S., Prosector to the Society.

[Received May 17, 1876.]

(Plates XLVIII.-LIII.)

A special analysis of the peculiarities of structure presented by different Passerine birds can hardly be considered premature. Since the investigations of Nitzsch, Sundevall, Keyserling and Blasius, Johannes Müller, and Cabanis little of decided importance has been made out with reference to the distinguishing characters of the group or of its primary divisions, if we except the researches of Professors Huxley and Parker on the palate in the class Aves generally. A glance at the history of the Order will be the best introduction which I can offer to the facts which it is my desire upon the present occasion to bring before the Society.

Although the name "Passeres" was coined by Linnæus, that illustrious naturalist did not appreciate the unity of the group, his classification compelling him to include the Columbæ in the order, which was defined as having "rostrum conico-attenuatum," and *Paradisea, Corvus,* together with *Certhia* among the "Picæ," "rostro superne compresso convexo."

Cuvier, in 1798[*], made a great step in advance by forming an order "Passeres" to include all those now so called, together with those non-swimming, non-wading, non-climbing, non-raptorial, non-gallinaceous birds in which there are not two toes of the foot retroverted.

Nitzsch[†] was the first to appreciate the true limits of the order, when in 1829 he grouped together the birds now termed PASSERES in a single section, entirely by themselves.

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[*] Tableau Elémentaire, p. 199 *et seq.*

[†] Observationes de Avium arteriâ carotide communi.

C. J. Sundevall, in 1831, discovered that in the birds which he had the opportunity of examining that belonged to the order Passeres of Nitzsch, and only elsewhere in *Upupa*, the tendon of the *flexor longus hallucis* is quite independent of the *flexor perforans digitorum pedis*, a bond of union of one kind or other * joining them in other birds.

Keyserling and Blasius †, in 1839, established the law that (with the exception of the Alaudidæ) those Passerine birds in which the form of the lower larynx (named "syrinx" by Professor Huxley) is what is known as "oscine," possess a pair of long scutes as a covering to the back of the tarso-metatarse. They may therefore be called *bilaminate*, to facilitate description, the term referring to the tarsal scutellation only.

Johannes Müller ‡, from his elaborate investigations on the structure of the syrinx in the South-American Passeres, was led to divide the group into two major sections—those in which the intrinsic muscles of the voice-organ are inserted into the ends of the bronchial semi-rings, and those in which they are inserted into their middle parts. I would suggest the name *Acromyodi* for the former of these divisions, and *Mesomyodi* for the latter—an acromyodian bird being one in which the muscles of the syrinx are attached to the extremities of the bronchial semi-rings, a mesomyodian bird being one in which the muscles of the syrinx join the semi-rings in their middles. It seems to me advisable to restrict these terms to Passerine birds.

Müller found that among the mesomyodian Passeres there is a large collection of genera in which an easily recognized special type of syrinx exists. This group he separated off as "Tracheophonæ," so naming them on account of the large share taken by the peculiarly modified lower end of the trachea in the formation of the voice-organ. In one respect he made a retrograde step, because he did not lay sufficient stress upon the value of Nitzsch's work; and this was that he united the mesomyodian Passerine birds which are not tracheophone with those families which constituted the more expanded "Passeres" of Cuvier and with the Scansores, wavering between the two classifications, which may be expressed, with the employment of the term introduced above, as follows:—

1. PASSERES ACROMYODI (Oscines).	1. PASSERES ACROMYODI (Oscines).
2. PASSERES MESOMYODI TRACHEOPHONI.	2. PICARIÆ.
3. PICARIÆ.	*a.* Passeres mesomyodi tracheophoni.
a. Passeres Mesomyodi non-tracheophoni.	*b.* Passeres mesomyodi non-tracheophoni.
&c.	&c.

From the above remarks it is evident that Müller was led to lay too great stress upon the nature of the syrinx as a distinctive feature of the Passeres; and although Nitzsch was unacquainted with the existence of the mesomyodian voice-organ, there can be scarcely any doubt that had he lived subsequently to Müller he would never have separated its possessors off from their oscine allies, considering that he had fundamental palatal and pterylographic characters to fall back upon.

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* *Vide* Methodi naturalis Avium disponendarum Tentamen, 1872, p. xl.

† Wiegmann's 'Archiv,' 1839, i. p. 332.

‡ Abhand. d. Berl. Akad. 1846, p. 367.

The investigations of Macgillivray * and others have made it evident that colic cæca (of small size) are present in all true Passerine birds; and this fact, when correlated with the universal presence of a nude coccygeal oil-gland, has led me † to place them in near relationship with those other Cuvierian Passeres (the Cuculidæ excepted) in which the oil-gland is nude and cæca coli are always present—away from the remainder of his group, in which no cæca are developed and the oil-gland is tufted. The Passeriformes and Piciformes thus defined, all wanting the ambiens muscle across the knee, are included in my major division of the *Anomalogonatæ*.

Taking the summation of the characters above referred to, in association with others too well known to require special mention, the Passeres may be defined as those Anomalogonatous birds with the 2nd, 3rd, and 4th toes of the foot directed forwards, and the hallux backwards, in which the *flexor longus hallucis* muscle is independent of the *flexor perforans digitorum*, the colic cæca are short, the oil-gland nude, at the same time that it is of a characteristic shape, and the palate ægithognathous ‡.

Among the Anomalogonatæ there are three toes directed forwards in the Bucerotidæ, Alcedinidæ, Coliidæ, Upupidæ, Coraciinæ, Momotinæ, Caprimulgidæ, and Meropidæ; the *flexor longus hallucis* is free from the *flexor perforans digitorum* in the Upupidae; colic cæca are present in the Caprimulgidæ, Coraciinæ, Momotinæ, Galbulidae, Trogonidæ, Meropidæ, and almost certainly so in the Bucconidæ, in which families also the oil-gland is nude; the palate is ægithognathous in *Thinocorus*, *Turnix*, and the Cypselinæ, nearly so in the Caprimulgidæ and Trochilinæ.

My investigations into the myology of birds have supplied me with another character of great practical value, which, though in one or two cases slightly disguised, is never found in any but veritable Passeres. It is a peculiarity in the method of insertion of the tendon of the *tensor patagii brevis* of the wing.

In the triangular patagium of the wing of the bird the tendons of two muscles are to be found. One is that of the *tensor patagii longus*, which forms the supporting cord of the free margin of the membrane itself. The second is that of the *tensor patagii brevis*, which courses parallel with the humerus, not distant from that bone, to the muscles and fasciæ of the forearm. In the Ramphastinæ, Capitoninæ, and Picinæ, where this muscle is less complicated than in any other birds, it arises, as is generally the case, from the apex of the upper of the two processes at the scapular extremity of the furcula, as well as by a small special slip from the superficial fibres of the *pectoralis major* muscle, which differentiates itself off from the main muscle near the upper part of its inserted extremity. The comparatively insignificant triangular or compound fleshy belly thus formed, with its apex directed towards the elbow, terminates in a cylindrical tendon, which, included between the layers of the fibro-cutaneous patagium, takes a straight course to its insertion into the axially-running tendon of origin of the *extensor metacarpi radialis longus* of Schöpss, at a short distance from the tubercle on the humerus whence the muscle springs.

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* Audubon's Ornithological Biography, 1838. † P. Z. S. 1874, p. 119.

‡ Prof. Huxley, "Classification of Birds," P. Z. S. 1867, p. 456.

As a result of this disposition, when the forearm is half-flexed, the tendon of the *tensor patagii brevis* is seen to enter the substance of the fibrous origin of the *extensor met. rad. longus*, and at right angles. This arrangement is indicated in Plate XLVIII. fig. 1, and is characteristic of the Picariæ, as defined by myself to include the three subfamilies above referred to and them only *.

Among the Passeres a slight, but easily recognizable, difference in the manner of insertion of the muscle maintains. The similarly single cylindroid tendon runs from the muscular belly, which has its origin at the shoulder, as above described, to the upper margin of the *extensor met. rad. longus* muscle, at an exactly similar spot: it does not, however, simply blend with the fibrous origin of that muscle; it becomes attached to it at the spot indicated, and then (again considering the forearm as half bent upon the humerus) runs back *independently* to be attached to the base of the tubercle of origin of the *extensor met. rad. longus*, slightly below that muscle's springing-point. As a consequence of this arrangement there are two tendons to be seen running to one spot (that on the upper margin of the *extensor met. rad. longus*, where the tendon of the *tensor* meets it) from two points, one the apex of the tubercle on the humerus above referred to, and the other, the depression at its base. These tendons therefore converge as they leave the elbow, having at first an appreciable interval between them, which is gradually diminished as they approach, although they remain quite free from one another, that of the *tensor* being superficial. A glance at Plate XLVIII. fig. 2, will serve to make this more clear.

I have had the opportunity of looking at this muscle in nearly 150 species of Passerine birds, belonging to nearly all the most important sections. I first observed it in *Pitangus sulphuratus*, and shortly afterwards recognized the same arrangement in *Hirundo urbica*. A Humming-bird (*Patagona gigas*) and a Swift (*Cypselus apus*) coming to hand at about the same time (the former through the kindness of Professor Newton) impressed me with the distinction between the Macrochires and the Swallows, as far as these elbow-muscles are concerned. Thus stimulated by the significance of the character, I have since taken every opportunity at my disposal to test its importance, the result being very favourable. Among the more aberrant genera I have examined are

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* P. Z. S. 1874, p. 123.

Struthidea,
Heteralocha,
Dicrurus,
Prosthemadera,
Melanocorypha,
Strepera,
Menura,
Atrichia,
Pitta,
Rupicola,
Lipaugus,
Tyrannus,
Chasmorhynchus,
Pipra,
Tityra,
Hadrostomus,
Cotinga,
Furnarius,
Picolaptes,
Thamnophilus,
Grallaria,
Pteroptochus,
Hylactes.

The only apparent exceptions I have found are the following. In *Pteroptochus albicollis* and in *Hylactes megapodius* the muscular fibres of the *extensor met. rad. longus* almost surround and enclose the tendons in question. Such being the case, the arrangement does not at first sight appear typically Passerine. Nevertheless, upon removing or pushing to one side these covering fibres, the two tendons are seen arranged exactly as in other members of the Order.

In *Menura superba* and in *Atrichia rufescens*, feeble-winged birds again, the arrangement is not typical, and the disposition of the parts is almost exactly as in the Pici, as above described. In other words there are not two tendons, one only being found, simple and broad, apparently produced by the blending of the two. Plate LI. fig. 2 represents the elbow-region of *Menura* as seen from its outer side.

All other Passerine birds which I have examined follow the single type, differing only in the angular divergence of the tendons, their humeral attachments being much separated in most Sturnidæ, Gymnorhinæ, and Tyrannidæ for example, but closely approximated in *Tropidorhynchus*, *Rupicola*, and others.

A short review of the peculiarities of the insertion of the *tensor patagii brevis* muscle in other birds will tend to render the importance of the character more clear, and may add some facts of interest in an ornithological point of view; for it is not in the least difficult for any one who has compared these structures in the various orders of the class to decide by an inspection of the outer surface of the elbow to which division any specimen belongs; and for the satisfaction of those naturalists who consider it essential that characters of importance should be verifiable on all occasions, it may be mentioned that from almost any skin it is possible to decide the point by soaking it, or the wing alone, in cold water, and carefully removing the tegument thus relaxed. On the present occasion the arrangement in the Anomalogonatæ will also be almost solely discussed, although among the Homalogonatæ characters of nearly equal significance are attainable, somewhat diminished in clearness in some cases by the diffused state of the tendons.

In the Galbulidæ, as represented by *Galbula albirostris* and *Urogalba paradisea* (spirit-specimens of both of which genera have been kindly placed at my disposal by Mr. Salvin), the tendon of the short *tensor* is simple, or it splits slightly before it meets the metacarpal extensor (where the distal moiety there terminates). Its main continuation sends back to the outer side of the lower end of the humerus a free fasciculus exactly like that above described in the Passeres, except that from about the middle of its lower margin a thin slip runs downwards and wristwards to the fascia of the ulnar side of the outer surface of the forearm. This is represented in Plate L. fig. 1.

In the Meropidæ, as represented by *Merops apiaster* and *M. ornatus*, the only difference from the Galbulidæ is that the distal branch is more clearly differentiated, and the slip to the ulnar side of the forearm is nearer the angular bend. This arrangement is represented in Plate XLVIII. fig. 3. In *Todus viridis* the tendons are similarly disposed.

In the Coraciidæ, as represented by *Coracias garrula* and a species of *Eurystomus* which was not in sufficiently good condition to be more definitely determined, Plate XLIX. fig. 1 represents the distribution of the tendons, there being two parallel to one another, the anterior one of which runs to the superficial ulnar fascia before terminating, and sends wristwards a slip, like that in the Meropidæ, to the long *extensor*. There is a Passeriform free tendon running back to the lower end of the humerus from the outer tendon.

In the Momotidæ the condition is the same, except that the outer tendon does not split, and therefore sends forward no wristward slip. This condition I have found in *Momotus lessoni*, in *M. æquatorialis*, and in *Eumomota superciliaris*. The extension onto the ulnar superficial fascia springs from the portion of the horizontal tendon intermediate between the points of junction of the two parallel long tendons, and is not a direct continuation of either. It is frequently very thin.

In the Trogonidæ, as exemplified by *Trogon mexicana*, *T. puella*, and *Pharomacrus mocinno*, the condition is very complicated. It is seen in Plate LI. fig. 3. A superficial long muscular mass runs nearly to the long *extensor* of the forearm. It has a short broad tendinous insertion into the fascia of the outer surface of the forearm; and this is specially developed in a line running back to the humerus in a Passeriform manner. Deep of this are two parallel tendons: the one nearer the humerus terminates exactly like the single one of the Passeres; that further off ends as in the Pici above described.

In the Caprimulgidæ, as found in *Caprimulgus europæus* and *Chordeiles texensis* the arrangement is almost exactly the same as in the Meropidæ. The second outer tendon, however, is shorter.

In the Macrochires, including the Trochilidæ and the Cypselidæ, as found in many genera and species the arrangement is uniform. The fleshy belly runs on to a special tendon which springs from the lower end of the outer surface of the humerus (where the horizontal slip in the Passeres terminates), and is continued, parallel to the forearm, along the radial margin to the hand. Plate LI. fig. 1 exhibits this condition. It can be here seen that the tendon of the *tensor patagii brevis* is not developed, being replaced by the fleshy continuation of the muscle.

In *Upupa epops* the arrangement is fairly simple. The main tendon runs past the free lateral margin of the long *extensor* to the ulnar superficial fascia, where it becomes lost. It sends forwards a fasciculus from about its middle, to end like the similar band in the Meropidæ. It is figured in Plate L. fig. 2. Its difference from the Passerine arrangement is well-marked.

In the Bucerotidæ, as found in several species of *Buceros*, *Toccus*, and *Bucorvus*, the only difference from *Upupa* is that the extra outer fasciculus is very much shorter, as seen in Plate XLIX. fig. 2. The lengthy tendon from the major pectoral, which is particularly large, is represented.

In the Alcedinidæ the differences are so considerable in the several genera that I reserve the description of the muscle in this order for a future occasion.

As the Cuculidæ and Musophagidæ are frequently included together with the families above referred to, the arrangement of the short tensor in these birds is represented in Plate L. fig. 3 and in Plate XLIX. fig. 3. In all the Cuculidæ the undivided tendon runs on to the ulnar superficial fascia without any complication. In the Musophagidæ the whole tendon is comparatively feeble, and, if it were more definite at its margins, would be exactly like that in *Upupa*.

Next, with reference to the division of the order Passeres into minor sections.

Four or five pairs of muscles running to the ends of the topmost three bronchial semirings constitute the Oscine syrinx, the distinctive features of which are therefore its acromyodian and complex nature. MM. Keyserling and Blasius were the first to associate with this the bilaminate planta—an exception to which occurs in the case of the Alaudidæ, as we all know, these birds possessing a divided planta together with an Oscine syrinx. Mr. Sclater has kindly referred me to a paper by Mr. Strickland[*] on *Heterocnemis nævia* (there called *Holocnemis flammata*), in which it is shown that in that Formicarian bird the character of the planta is indistinguishable from that of the bilaminate Oscines. With reference to this and closely allied genera it must be noted that the scutellation of the front of the tarsus is also obliterated, so that the simplicity of the planta is only a participation of the condition which maintains in the tarsus generally. Therefore, with this exception (which from its associations can hardly be looked upon as such), it may be said as yet that *no bird which is not acromyodian has a bilaminate planta*.

Nevertheless the law enunciated by Cabanis, to the effect that when in a Passerine bird possessing ten primary remiges the first is very long, then that bird is not Oscine (or Acromyodian), but "Clamatorial" (or Mesomyodian), led that able ornithologist to place *Pitta* in the latter group, although it possesses a bilaminate planta; since which time Johannes Müller is not the only biologist who has wished to know the nature of the syrinx of that bird, of which Sundevall[†], in 1872, remarks, "musculi laryngis inferioris ignoti."

[*] Annals and Mag. Nat. Hist. 1844, vol. xiii. p. 415.

[†] Method. nat. Av. disp. Tentamen, 1872, p. 5.

Through the kind permission of Dr. Günther I have had the opportunity of dissecting two specimens of each of two species of the genus *Pitta*, namely *P. cyanura* and *P. angolensis*, from the National Collection; and Mr. Sharpe had previously very liberally given me a specimen of the Javan species, the dissection of which had led me in my paper "On the Carotid Arteries of Birds" to remove it from the Oscines *, as Cabanis had done from its wing-characters. Two specimens of *Pitta angolensis* from Fantee, and three of *P. cyanura* from Java, have therefore formed the material for the present description.

In *Pitta angolensis* the unmodified trachea terminates thoracically in a ring, split behind, and deep in front; which, from the fact that it presents irregularly placed fenestræ on its anterior surface, arranged in a somewhat transversely linear manner, appears to have been formed by the fusion of two rings. This terminal segment of the trachea does not, as in the Oscines and several other Passeres, form a three-way piece, because there is no antero-posterior bar traversing its inferior margin in the middle line. Of this, however, there is an indication in the form of a median backward-directed process, which advances a short distance into the inferior membraniform completion of the tube, from its anterior border. The tracheal ring last but one is complete, and has a slight median indentation in its inferior margin behind. These points are seen in Plate LIII. figs. 1, 2, & 3.

The first and second bronchial ring-segments are semirings—not modified into the somewhat separate, round-margined, slightly oblique semicircles of fibro-cartilage or bone which, as usual, are found nearer the lungs, but are like moieties of true tracheal rings, approximate, sharp-edged, and at right angles to the axis of the tube. They present no peculiar processes, and are slightly swollen at their anterior extremities.

There is only a single pair of bronchial muscles, continued down from the sides of the windpipe; insignificant in size; quite lateral, and terminating by being inserted into the middle of the outer surface of the second bronchial semiring.

Pitta cyanura differs from *P. angolensis* only in detail, not in plan of conformation. There are four instead of two syringeal bronchial semirings, to the middle of the last of which the single extremely feeble lateral muscle is attached on each side. In it also the last two tracheal rings, and not the last only, are incomplete behind, the last presenting a greater gap than the one above it. This syrinx is figured in Plate LIII. figs. 4, 5, & 6.

Pitta is therefore mesomyodian, in which respect it differs from all the known Old-World Passeres—although *Philepitta*, with its lengthy first primary, is most probably the same in this respect.

With reference to other points in the anatomy of the genus, it may be mentioned that in both *Pitta angolensis* and *P. cyanura* there is but one carotid artery, the left. The oil-gland is nude. The colic cæca are between one eighth and one tenth of an inch in

* P. Z. S. 1873, p. 463.

length; and the muscles of the thigh are similarly arranged to those of most Passeres, the myological formula * being *A,XY*, the *ambiens* muscle being absent, at the same time that the *flexor longus hallucis* is quite independent of the *flexor digitorum perforans*. The palate is beautifully figured by Mr. Parker in his memoir on Ægithognathous birds †; and I take this opportunity of giving a view of the back of the skull and of the sternum, which present features of interest. It will be noticed that the temporal fossæ extend across the occipital region of the skull, and nearly meet in the middle line behind; this condition, though frequently found in other families, is not one possessed by any Passerine birds except *Pitta*, as far as I am aware. Plate LIII. fig. 8 shows the sternum of *P. cyanura*; in it the sternal notches are particularly deep.

Menura superba is another bird in which our knowledge of the structure of the syrinx is very deficient. Mr. Eyton has described it ‡; but his account will bear supplementing. He tells us that "in addition to the usual sterno-tracheal muscles this curious bird has two other pair, both of which have their origin on the rings of the trachea on each side, at the point where it enters the cavity of the thorax. The anterior pair is inserted on the knobs at the extremities of the fourth bones of the bronchiæ; the posterior pair are also inserted on the bronchiæ, but on the three uppermost rings and on the posterior extremity of the fifth."

Several opportunities having occurred to me (partly through the kindness of Professor Flower in allowing me to dissect a specimen beautifully preserved in the Royal College of Surgeons, partly through the assistance of Mr. Edward Gerrard, and partly from my prosectorial advantages) of dissecting the syrinx of *Menura superba*, I take the present opportunity of describing it in detail and figuring it.

In *Menura superba* the last sixteen rings of the trachea are peculiarly narrow from above downwards. These are carinate in front; in other words, instead of being flattened from without inwards (as is usually the case, and is so in the rings above the sixteenth in this bird), they are compressed from above downwards, by which means a sharp-edged ridge is developed, which projects outwards a short way beyond the level of the interannular membrane. The lowest of these rings, the last tracheal, whilst participating in this peculiarity, is modified to form the three-way piece, whence start the bronchi, an antero-posterior bar joining the downward-directed angles which are developed on the middle of the front and back of the ring, and supporting the syringeal semilunar membrane.

As in the typical Oscines, the first three bronchial semirings participate in the formation of the syrinx, and are modified accordingly, being stronger, deeper, more flattened, and more approximate than those which follow. The first of these is simple; the second is peculiar in being hollow and thin-walled, broader in front than behind, and broadest a short distance (about equal to its depth at the spot) posterior to its anterior extremity; the third is narrower, and terminates behind by a short descending hook.

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* *Vide* P. Z. S. 1874, p. 111.

† Trans. Z. S. vol. ix. pl. lvi. fig. 6.

‡ Ann. & Mag. Nat. Hist. 1841, vol. vii. p. 49.

The syringal muscles are three in number on each side at their insertion, although at their origin only two can be distinguished. These are an anterior and posterior longitudinal, which, from a lateral point situated opposite the tracheal ring 19 above the last one, diverge forwards and backwards to the tips of the bronchial semirings. In Plate LII. figs. 1, 2, & 3 the front, back, and side views of the syrinx of *Menura* are figured.

The *anterior longitudinal* muscle, whose diameter is about four times that of the *depressor tracheæ*, is of uniform size throughout, being constituted of parallel fibres. It is inserted into the lower margin of the expansion at the anterior extremity of the second bronchial semiring, at a short distance behind its apex.

The *posterior longitudinal* muscle, from being single above, divides into two below.

Before proceeding further it will be necessary to explain the way in which these muscles arise. There is a large air-cell, the anterior thoracic *, in which the syrinx and base of the heart are situated. The visceral walls of this cell are so thin that the trachea may, to all intents and purposes, be said to perforate it. Where it does so, the membrane blends with its fascial sheath most intimately; and it is from the thus formed ring of junction that the long fibres of the syringal muscles spring. This ring is not a simple horizontal circle of fibrous tissue surrounding the trachea. In its anterior half it is so; but behind it descends for some distance on each side to a median spot situated below its general level, at a distance beneath it equal to the diameter of the tube itself, to blend at the angle thus formed with a strong fibro-cartilaginous ribbon, which expands below the level of the bronchial bifurcation, to terminate as a membranous covering to the front of the œsophagus.

From the postero-lateral portion of the horizontal moiety of the ring just described, and from its descending limb, the posterior longitudinal muscle of the syrinx arises, on each side, powerful, and in a single mass, of which the longer postero-external fibres, as it descends, differentiate themselves off to form an independent fasciculus, which is inserted into the posterior hooked extremity of the third bronchial semiring. The other much larger internal portion, composed mostly of much shorter and oblique fibres, is inserted into the posterior triangular surface of the tracheal three-way piece (last tracheal ring), and into the posterior extremity of the first bronchial semiring, a few of its tendinous fibres of termination apparently running on to the back of the membrane between the first and second semiring, and perhaps slightly to the back of the second semiring itself, although this last seems to be independent in this respect.

The comparatively slender *musculus sterno-trachealis* springs from the lateral surfaces of the four or five tracheal rings above the last two, emerging between the anterior and posterior intrinsic muscles.

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* *Vide* Owen's 'Anatomy of Vertebrates,' vol. ii. p. 211.

Menura superba, from the above description, is therefore acromyodian, although not typically Oscine.

Atrichia rufescens presents precisely the same arrangement as *Menura*. There are three modified bronchial semirings, the third descending posteriorly, and the second expanded a short distance before it reaches its anterior termination, the anterior longitudinal muscle being there inserted. The posterior muscle, however, does not clearly separate into two before it reaches its points of insertion, which are identical with those in *Menura*. The lower tracheal rings are different, in that they are not flattened from above downwards; they retain the characters of those above them to a great extent. The last forms the characteristic three-way piece. In Plate LII. figs. 4, 5, & 6 these points are clearly seen.

Atrichia is therefore also Acromyodian, although far from being normally Oscine. It would require but little modification in either it or *Menura* to convert their syringeal muscular masses into more numerous independent muscles. In the Crow, Starling, and most of the other Oscines I have examined, the third semiring is the one to which the long anterior muscle runs, the long posterior not going beyond the second. This condition is just reversed in the two birds under consideration. In the Finches the arrangement described by Cuvier maintains, both anterior and posterior long muscles running to the third bronchial semiring.

In Plate LII. fig. 7 the sternum of *Atrichia* is figured with the rudimentary clavicles (*f*), which are nothing more than granules of bone. No other Passerine bird wants the furcula, so far as is yet known. The manubrium sterni is not largely expanded.

There is another feature in Passerine anatomy which has interested me considerably during my investigations. It is the rule among birds, almost without exception, that the main artery of the leg is that which must be supposed to be represented in Man by the *comes nervi ischiatici*, it accompanying the sciatic nerve—the sciatic artery. The main nerve of the leg is the sciatic; the main vein the femoral. The only known exceptions to this rule are the cases of the genus *Dacelo* among the Alcedinidæ, and *Centropus* among the Cuculidæ. In the former the femoral vein is replaced by the one which is intermediate in situation between its usual course and the sciatic artery; in the latter the sciatic artery is absent, and is replaced by the femoral *.

In a certain few Passerine birds the main artery of the leg is the femoral, and not the sciatic. These genera are all members of the Oligomyodi of Müller; and the accompanying list contains the names of all the Oligomyodian species (taken from Messrs. Sclater and Salvin's 'Nomenclator Avium Neotropicalium' †) which I have had the opportunity of examining, with the results arrived at, as far as this peculiarity is concerned.

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* Proc. Zool. Soc. 1873, p. 629.

† London, 1873.

Passeres Oligomyodi.

With a femoral artery.	With a sciatic artery.
Chiroxiphia linearis,	*Mionectes oleagineus*,
Chiromachæris vitellina,	*Tyranniscus vilissimus*,
Heteropelma verœpacis,	*Pitangus sulphuratus*,
Tityra personata,	*Myiodynastes luteiventris*,
Hadrostomus aglaiœ,	*Empidonax minimus*,
Lipaugus sp.,	*Myiarchus crinitus*,
Cotinga cincta,	*Tyrannus melancholicus*,
Chasmorhynchus nudicollis.	*Rupicola crocea*,
	Pitta angolensis,
	Pitta cyanura.

I must mention also that in a specimen of the minute *Mitrephorus phœocercus*, it appeared to me that the artery of the leg was the femoral; but I should like to see more specimens before I can feel justified in disturbing any generalizations by using this single example.

All Acromyodian Passeres of species which I have examined, over one hundred in number, possess the sciatic artery, including *Menura* and *Atrichia*; and the Tracheophonæ quite agree with them in this respect. Such being the case, it seems to me that from among the Mesomyodian Passeres a small section may be divided off, including the families Pipridæ and Cotingidæ, in which a characterizing feature is the development of a femoral in place of a sciatic artery; and this being the case, *Rupicola* must be removed from the Cotingidæ.

Although, as yet, our knowledge of the anatomical characters which are the bases of the minor divisions of the Passerine group is still so little advanced, nevertheless a rough sketch of the classification of the order, in which no attempt to fill-in details can be made, is quite within our power.

To commence with Müller's character depending on the situation of the insertions of the syringeal muscles, Passerine birds fall primarily into two main sections, the ACROMYODI, in which the intrinsic muscles of the voice-organ are fixed to the end of the bronchial semirings, and the MESOMYODI, in which they join them at or near their middle. The former group includes all the true Oscines, together with *Menura* and *Atrichia*; the latter the Tracheophonæ, together with those Passeres included by Müller with the Picariæ, as well as Pitta.

The Mesomyodi fall into two groups, according to the situation of the main artery of the leg. Those in which the sciatic is the artery of the thigh may, because they therein agree with other birds, be termed *Homœomeri*; those in which the femoral artery is developed, from being in this respect abnormal, may be termed *Heteromeri*.

Of the Homœomeri the Tracheophonæ of Müller form a special well-marked section,—the rest, including the Tyrannidæ, *Rupicola*, *Pitta*, forming a division which may be termed Haploophonæ until there is reason for further splitting them up.

The following tabular arrangement expresses these views:—

PASSERES.
- ACROMYODI (Oscines).
  - NORMALES.
  - ABNORMALES.
    - Menurinæ.
      - *Menura.*
      - *Atrichia.*
- MESOMYODI.
  - HETEROMERI.
    - Pipridæ.
    - Cotingidæ.
  - HOMŒOMERI.
    - Tracheophonæ.
    - Haploophonæ.
      - Tyrannidæ.
      - *Rupicola.*
      - *Pitta.*

In conclusion I have specially to thank Mr. O. Salvin for the extremely kind way in which he has placed at my disposal a large collection of Mesomyodian birds in spirit. From this I have been able to make out the peculiarity in the distribution of the vessels in the leg; and from it also I hope to obtain materials for another paper shortly, in which the syrinx of some of the yet little-known forms will be described.

EXPLANATION OF THE PLATES.

Plate XLVIII.

Fig. 1. View, from the outer side, of the muscles of the patagium of the left wing of *Ramphastos cuvieri*, the radius and ulna being bent at right angles to the humerus: *t.p.l*, tensor patagii longus; *t.p.b*, tensor patagii brevis; *e.m.r.l*, extensor metacarpi radialis longus; *d*, deltoid; *t*, triceps; *b*, biceps; *S.R*, secondary remiges.
2. Same of *Icterus vulgaris*.
3. Same of *Merops apiaster*.

Plate XLIX.

Fig. 1. Same of *Coracias garrula*.
2. Same of *Buceros rhinoceros*.
3. Same of *Musophaga violacea*.

Plate L.

Fig. 1. Same of *Urogalba paradisea*.
2. Same of *Upupa epops*.
3. Same of *Cuculus canorus*.

Plate LI.

Fig. 1. Same of *Patagona gigas*.
2. Same of *Menura superba*.
3. Same of *Trogon puella*.

Plate LII.

Fig. 1. Syrinx of *Menura superba*, front view.
2. Same, back view, with median fibrous attachment retained.
3. Same, view of right side.
4. Syrinx of *Atrichia rufescens*, front view.
5. Same, back view.

Fig. 6. Same, view of right side.
7. Sternum of *Atrichia rufescens*; *f*, rudiment of furcula.

PLATE LIII.

Fig. 1. Syrinx of *Pitta angolensis*.
2. Same, back view.
3. Same, side view (left).
4. Syrinx of *Pitta cyanura*.
5. Same, back view.
6. Same, side view (left).
7. Back view of skull of *Pitta cyanura*.
8. Sternum of same.

N.B. Although the artist has done all in his power to make clear the peculiarities of the insertion of the *tensor patagii brevis* in the families of birds here depicted, it is important to mention that in actual specimens the differences are much more easily recognizable than might be inferred from the figures.

June 20, 1876.

Professor Flower, F.R.S., V.P., in the Chair.

Mr. Sclater exhibited a drawing of a fine species of Fruit-pigeon of the genus *Carpophaga*, taken from two specimens living in the Society's Gardens, and pointed out that these birds, which had been received in exchange from the Zoological Society of Amsterdam, September 9th, 1874 *, had been incorrectly determined as *C. sylvatica*, and apparently belonged to *C. paulina*, Bp., of Celebes and the Sula Islands.

Extracts were read from letters received from Signor L. M. D'Albertis, C.M.Z.S., dated Sydney, March 27th, and from Dr. G. Bennett, dated April 15th, respecting Mr. D'Albertis's proposed new expedition up the Fly River, New Guinea.

Mr. Sclater also exhibited a small collection of bird-skins collected at Yule Island and on the adjoining coast of New Guinea, which Mr. D'Albertis had transmitted to him for examination.

Mr. Sclater stated that, the collection having been only just received, he had not had time to examine it carefully, but took the opportunity of pointing out the characters of two apparently new species of Parrots, of which it contained examples, as follows:—

1. TRICHOGLOSSUS SUBPLACENS, sp. nov.

Psittaceo-viridis, pileo summo flavicante; macula magna auriculari utrinque cærulea; subtus dilutior, lateribus et alarum tectricibus inferioribus coccineis; remigum pagina inferiore nigra fascia flava intersecta; rectricibus ad basin coccineis, inde nigris flavo terminatis, harum duabus mediis supra viridibus subtus nigris, linea media coccinea versus apicem occupatis; rostro rubro; pedibus rubro-flavidis: long. tota 6·5, *alæ* 3·5, *caudæ* 2·8.

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* See P. Z. S. 1874, p. 695.

Hab. Mountains of Naiabui, south of New Guinea (*D'Albertis* et *Tomasinelli*).

Obs. Similis *T. placenti*, sed uropygio dorso concolori nec cæruleo, pileo distinctius flavido et rectricibus magis rubris diversus.

2. Cyclopsitta suavissima, sp. nov. (Plate LIV., ♂ et ♀.)

Supra psittaceo-viridis, remigibus nigricantibus, horum limbo exteriore cum fronte lata cæruleis; loris albis, genis nigris, gula media et fascia lata colli antica lactescenti-albis; pectore toto aurantiaco, ventre et tectricibus subalaribus pallide viridibus; rostro et pedibus nigris, iride nigra: long. tota 4·7, *alæ* 3·2, *caudæ* 1·3. Fem. *mari similis, sed genis cærulescentibus, colli lateribus aurantiacis et pectore flavicante diversa**.

Hab. Naiabui, New Guinea, September 1875 (*D'Albertis* et *Tomasinelli*).

Obs. Affinis *C. melanogeniæ* ex inss. Aroensibus, sed fronte cærulea distinguenda.

The following Letter, addressed by Commander W. E. Cookson, R.N., to Dr. Günther was read :—

"H.M.S. 'Peterel,' at sea,
"lat. 42° 40′ N., long. 28° 30′ W.
"May 29, 1876.

"In accordance with the wish of Rear-Admiral the Honourable A. A. Cochrane, I have much pleasure in forwarding to you two living tortoises, which I obtained from Albemarle Island when on a visit to the Galapagos group during June of last year.

"Before directing me to proceed to these islands, Admiral Cochrane sent me a copy of your letter to him, of May 18th, 1874, respecting their fauna, and desired me, if possible, to forward your wishes. This I have not succeeded in doing as thoroughly as I could wish; but I hope the specimens I have obtained may not be without value. The two living specimens are male and female, and undoubtedly adults; we found them about four miles inland, on a small elevated plain at the north-western extremity of the island. The plateau on which they were found was covered with stunted bush and high, very coarse, grass, through which their tracks were very numerous.

"Together with these live tortoises I send you the shells of five others, lettered A, B, C, D, and E. A, B, C are the shells of tortoises which we took from Abingdon Island; D, and E are from the same locality on Albemarle Island as the live ones come from.

"I greatly regret that the two Abingdon tortoises, which I hoped to have kept alive, died after being a few weeks on board, more especially as I believe a comparison between these and those from Albemarle Island will be a point of much interest; for the officers and myself were much struck with the difference in their general appearance. The most striking and what, I presume, would be the most *important* difference, is the *apparently* much greater length of the neck of the Abingdon tortoise. These creatures arch their neck considerably when stretching it out. All the four Abingdon tortoises we found had the jaws yellowish white, and nostrils pale pink; in the Albemarle tortoise these parts are nearly black. The carapace of the Abingdon tortoise is more compressed at the sides, slopes gradually up from the hind quarters to the shoulder, and has the back more arched than the Albemarle; but it is in the part protecting the head that the greatest difference lies, it being in the Abingdon tortoise contracted into a narrow highly arched hood-like form, which gives those animals a most singular appearance.

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* I am indebted to the kindness of Count T. Salvadori for the loan of the skin of the female of this species, as likewise of skins of *C. melanogenia* for comparison.—P. L. S.

"As I have mentioned above, the two Abingdon tortoises died after being five or six weeks on board. The first (A) died at sea; and, owing to its size, I had no means of preserving it entire; but I have kept the vertebræ of the neck (bone diseased); and all the skin of the legs, neck, hind quarters, &c. is left attached to the carapace. The other Abingdon tortoise died after our arrival at Honolulu; there, fortunately, we met the 'Challenger'; and Professor Wyville Thomson most kindly preserved it for me in spirits. This tortoise, I presume, you have long since received, as Admiral Cochrane took it on board H.M.S. 'Repulse' in August last.

"Thinking that some of the information I gathered during my cruise amongst these islands may be of interest to you, I will give a few particulars about the tortoises, &c. &c.

"On our arrival at the settlement on Charles Island, we were entertained by the inhabitants with stories of tortoises of gigantic and marvellous size having been found on the islands twenty or thirty years ago, some being described as being so large as quite to rival the fossil tortoise of the Sewalik Hills; but none of these traditions were well authenticated. One in particular, which was conveyed to Peru in an English ship, was said to have weighed a ton. As I was informed that it came into the possession of Mr. Blacker, H.M. Consul at Payta, I wrote to that gentleman asking him if he could give me any information about it. In reply he says:—'I can only say that some fifteen or sixteen years ago an English captain did bring a very large tortoise, which was transmitted by him to Callao, and there exhibited on board, a charge being made for the privilege of seeing it, and finally shipped to England as a curiosity. The weight must have been considerable; but I cannot say it weighed a ton, which appears too much of a good thing; half that weight would have been about near the mark I should say.' Probably 6 or 7 cwt. would be nearer its actual weight; at any rate none of the present inhabitants, some of whom have been engaged in hunting tortoises for the last fifteen years, pretended themselves to have seen any weighing more than from 3 to 4 cwt.; and they considered the tortoise I send you (which weighed 240 lb. when taken) as large as any that are found now. I preserved a portion of the skull of what was said to be the largest tortoise seen for twelve or fifteen years; it was killed about six months before our arrival at the S.W. end of Albemarle Island. I landed at the spot in the hope of procuring the shell; but it was so decayed from exposure that I did not bring it away. The remaining portion of the skull could not be found.

"The settlers on Charles Island informed me that the tortoises are quite extinct on this island, and that only a very few are thought to remain on Chatham Island, these few (if any) being at the S.E. end of the island, which is the furthest point from the settlement, and a part which is covered with very dense bush. These two islands are the only ones of the group which are permanently inhabited. Hood, James, and Indefatigable Islands still contain a few tortoises in their most inaccessible parts; but they are so scarce that they are not now hunted on these islands: on parts of Albemarle Island it was said that they were still plentiful, especially at the S.E. end, where landing is generally impossible, and that some were to be found on the small island of Abingdon. To my inquiries as to whether the tortoises were different on the different islands, I received conflicting answers: some said they were all alike, others that there was a difference in shape, &c., &c.; and amongst other things I was told that the tortoises on Abingdon Island had white heads and feet, whereas those on the other islands had these parts black. They were said also to differ in shape from those of most of the other islands, but that the Hood-Island tortoise resembled the Abingdon, the same comparison to the Spanish saddle being used by them which Mr. Darwin quotes (Nat. Voy., new ed. p. 394). As Hood and Abingdon Islands are the most distant from one another of any in the group, it would have been very interesting to ascertain if their tortoises really resembled one another, whilst they differed from those of the other islands; but my whole stay in the archipelago was limited to a fortnight, and during that time I had to visit the settlements and collect information on various subjects for a general report on the islands; and as the inhabitants told me that my whole fortnight might be spent in a fruitless search in either Hood, James, or Indefatigable Islands, I was obliged to give up the idea of obtaining specimens from more than two islands, and decided upon obtaining some, if possible, from Albemarle and Abingdon Islands.

"At Charles Island I was fortunate enough to secure the services of an Englishman who has been engaged in making tortoise-oil for the last fifteen years; without his guidance we should, I think, have failed in our search on Abingdon Island.

"Our searching party on Abingdon Island consisted of 20 men, besides several of the officers. After some search we found four tortoises; one of these, owing to want of sufficient hands to carry them all, was killed on shore (shell "C"). The other three we brought on board the ship; it cost us, however, two days of very hard work: they had to be carried, slung from poles, a distance of six miles through a bush so thick that a trail had to be cut for the whole distance; besides which the whole surface of the island is covered with irregular blocks of lava, making the walking with a heavy load exceedingly tedious and laborious. To get the tortoises into the boats we had to lower them over the cliff, a height of about 200 feet. During this process, and more especially in the carrying-down, they received some rough treatment. There was no external injury; but whether caused by this or not, these tortoises never thrived like those we got from Albemarle Island; and, as I mentioned before, the two kept died after having been less than seven weeks on board, whereas all those from Albemarle Island remained in good health.

"Referring to the report that the Abingdon-Island tortoises had white heads and feet, I may here remark that of the four we found all had some of the nails of their toes yellowish white (a peculiarity which we did not observe in any of the Albemarle-Island tortoises); and their jaws were of the same colour, as I have before observed. Perhaps white colouring is only a mark of age.

"I will here describe the four Abingdon tortoises we obtained.

"'A' weighed 201 lb. when taken. This tortoise had every appearance of great age: its skin was very wrinkled and white, and the shell much battered and indented, with several patches of parasitic growth on it, which had the appearance of common bark-lichen. The vertebræ of the neck were diseased. This tortoise died at sea after being on board about six weeks.

"'B' weighed 131 lb. It was killed at sea, as I could not preserve all alive, and I hoped to keep the two larger ones. This tortoise was an adult male.

"'C' was killed on shore and not weighed.

"The fourth Abingdon tortoise is the one I have mentioned as having been kindly preserved in spirits for me by Professor Thomson, and which I hope has already reached you; it weighed 173 lb. when taken, and bore marks of age.

"From Abingdon Island I went to Tagus Cove, Albermarle Island; and here, on the small plain above mentioned, situated a few miles from the anchorage in the cove, we found altogether about 24 tortoises. Three were adult males, and weighed respectively 240 lb., 185 lb., and 173 lb.; three or four females also, averaging about 100 lb. in weight, were said by our guide to be full-grown; the remainder were in various stages of growth. The smallest found weighed 9 oz., and was pronounced to be about four years old. Of these, I have now on board the largest male and female; the pair next in size, together with two young ones in different stages of growth, Admiral Cochrane took on board the 'Repulse' in August last. Probably you have already received these tortoises, as the Admiral expressed his intention of forwarding them by the first opportunity.

"A tortoise which we found at the S.W. end of Albemarle Island, near to Iguana Cove, was also put on board the 'Repulse,' and, I hope, has safely reached you. This tortoise, a male, weighing 175 lb., was pronounced by our guide to be decidedly full-grown; but it differed considerably in shape and general appearance from all the full-grown tortoises we saw near Tagus Cove, being much more compact, and rounder in shape, and having the lines on the margin of the plates of the carapace quite sharply defined as in the young tortoises (which it resembled in shape), whereas in all the full-grown tortoises we had hitherto seen these lines were almost entirely gone. It was at this spot that our guide found, a few months before our visit, the largest tortoise that he had seen for the last fifteen years; he estimated its weight at about 400 lb.

"I have already mentioned that the shell of this large tortoise was so decayed that I did not take it on board; but I took some measurements of it, and am satisfied from these and its shape that the animal had the characteristics I have just described. The epidermoid layer of the shell had for the most part come away; but where fragments were left, the marginal lines of the plates showed quite distinctly. I suppose that abundance or variety of food would be sufficient to produce this difference of appearance in the tortoises from different localities in Albemarle Island, this part of the island, the S.W. end, having a comparatively luxuriant vegetation, whereas the neighbourhood of Tagus Cove is described by Mr. Darwin as being 'miserably sterile;' but it is a point not to be overlooked that these two localities are separated by a coast-line of 70 miles, and that between them lie three of the highest volcanic peaks of the whole group, one if not two of which have been active until quite recently; and from the flanks of all three streams of black lava descend, each several miles in width. Again, the most northern of these craters is situated almost in the centre of the narrowest part of the island, just a little to the north of Perry Isthmus, and sends down its black streams in all directions; so that this part of the island is exactly like Narborough Island opposite, which is described as 'a great volcano, whose base is surrounded by an extensive field of lava; it is utterly barren and desolate.' I think one may conclude that these lava streams are quite impassable to the tortoises, and that, as far as these creatures are concerned, the north and south ends of the island are as effectually separated as they would be by a channel of 40 or 50 miles of deep water.

"With regard to the greatly reduced numbers of these animals in most of the islands, and probable extinction in others, it is known that Charles and Chatham Islands have been inhabited for forty years, which fully accounts for the extinction of the tortoises in these islands, as they have always been eagerly sought for, the oil made from their fat being very valuable and their flesh much esteemed. Their habit of paying periodical visits to their watering-places, and the very plain tracks which they make through the bush or high grass, lead to their easy discovery. The track of a large tortoise is exactly that which a cart with very broad wheels and low body would make drawn over similar ground: the feet make a trail such as the wheels would leave; and between the 'ruts' the grass and low bushes are flattened down by the animal as they would be by the body of the cart. Hood Island never, I believe, had great numbers on it; but James and Indefatigable Islands, where they were at one time so numerous and are now so scarce, have long been resorted to by oil-makers. (Admiral Fitzroy found a party making oil on James Island in 1835.)

"To show the havoc made amongst the tortoises by oil-makers, I may mention that at the time of our visit a party of seven were making oil on Albemarle Island; during the last twelve months they had made 3000 gallons of oil, which quantity would represent the destruction of at least an equal number of tortoises; for although a large one will yield as much as six gallons of oil, the average yield would not be more than one.

"The whalers, who till within the last four or five years visited the islands to the number of 40 or 50 annually, committed great destruction amongst them; their crews living on them for several months, and when they left the ground taking large numbers to sea with them, some ships as many as a hundred.

"Of late years these defenceless creatures have had another very destructive enemy amongst them, viz. the wild dogs, descendants of dogs that have been turned adrift from ships or strayed away from time to time. Dogs are now roaming wild on all the larger islands. I was told that they keep in small packs of about eight or ten. We heard them on several occasions amongst the hills on Albemarle Island; and, judging from their cry, I should think there were about that number in the pack. They were described as large, gaunt, savage animals; but I could not get any accurate information as to their colour, and whether it was uniform or not. These animals must make great havoc amongst the tortoises. They are said to watch when the newly hatched young ones first begin to agitate the sand, then to scrape it away and devour the whole brood. They prey also upon the half-grown animals; two which we found, each about 60 lb. in weight, had the back part of the breast-plate gnawed by dogs; in one it was still bleeding; and I saw the shells of two others of about the same size, from which the animals had been eaten clean out.

"On account of the size of Albemarle Island, and the inaccessibility of many parts of it, I think tortoises are still very numerous on it and likely to be so for a long period in spite of their many enemies; but on the other islands, including the smaller ones, such as Abingdon and Hood Islands, where they have been hitherto comparatively unmolested, I think that they are now doomed to speedy extermination, for this reason, that within the last two years the Orchilla trade has passed into the hands of one individual, and the crop is now gathered by a gang of 60 or 80 men working together, instead of by a number of small parties scattered on the different islands. At the time of our visit the Orchilla crop had just been gathered from Hood Island, and the camp after a four months' residence on it had moved to Chatham Island. It was said that about 70 tortoises had been killed by these people on Hood Island; and our guide thought it most probable that none were left alive. As they pass on to Abingdon and the other smaller islands, the tortoises on them must share the same fate; for in three or four months a party of 60 men, but sparingly provisioned and hunting eagerly for them, would be almost sure to discover every individual."

Dr. Günther stated that not only the living tortoises, but also the shells of the specimens described in the foregoing letter, with a large and highly interesting collection of other zoological objects had arrived. There had not been sufficient time to examine the whole of the contents; so that a full report must be deferred to a future meeting of the Society. At present he exhibited the largest of several specimens of *Amblyrhynchus cristatus* (4½ feet long), and carapaces of the Abingdon and Albemarle Tortoises. The former was probably identical with *Testudo ephippium*; the latter came nearest to *Testudo elephantopus*. However, the skulls had not been extracted from the skins, and therefore could not yet be used in the determination of the species. Of the living examples collected by Commander Cookson at Tagus Cove, Albemarle Island, four had safely arrived in England, and were now living in the Gardens of the Society—two large ones, a pair, brought in H.M.S. 'Peterel,' and two smaller ones, probably both females, transferred by Commander Cookson to H.M.S. 'Challenger,' in which ship they arrived some weeks ago. None of the specimens put on board the 'Repulse' had arrived in England; and it was reported that all had been lost during a storm encountered by that ship on her voyage home.

Dr. Günther also mentioned on this occasion that he was now convinced that the two Aldabra Tortoises which were obtained last year, and which, owing to the excellent arrangements made at the Gardens, were doing very well, belonged to two distinct races (as pointed out in the forthcoming second part of his paper on these animals), viz. the male to *Testudo elephantina*, and the female to *T. hololissa*.

The following papers were read:—

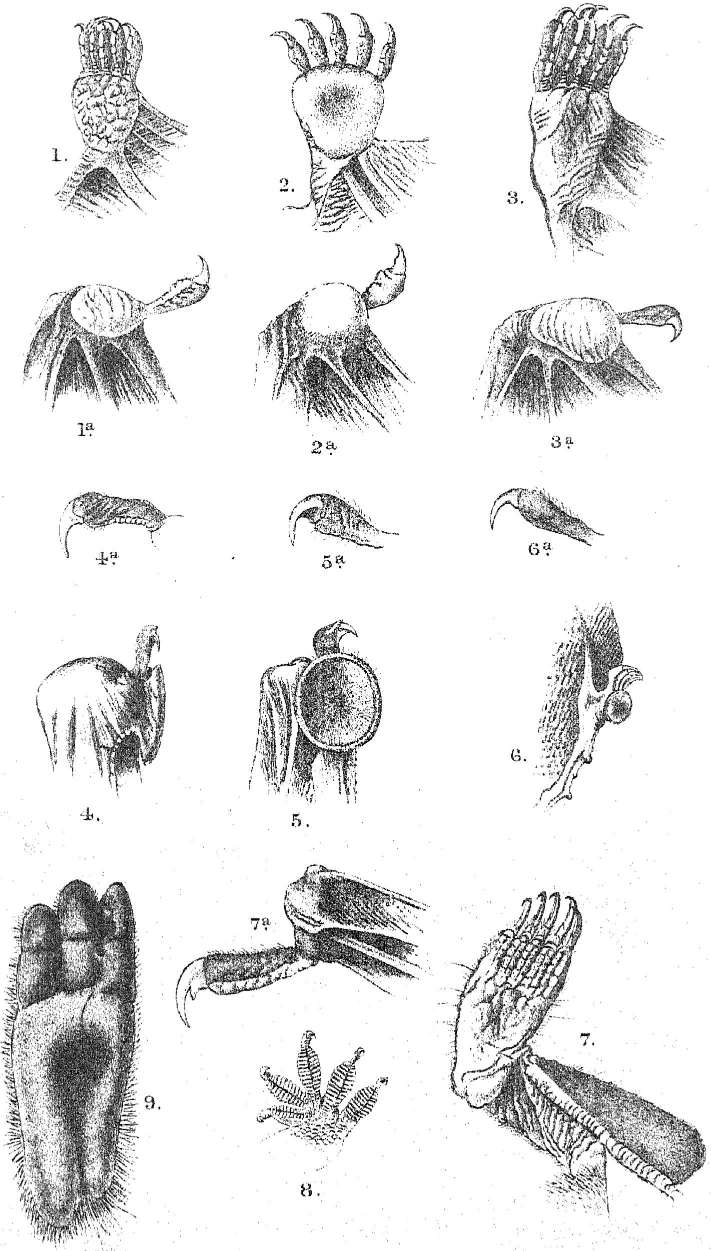
1. On peculiar Structures in the Feet of certain Species of Mammals which enable them to walk on smooth perpendicular surfaces. By G. E. Dobson, M.A., M.B., F.L.S., &c.

[Received May 26, 1876.]

(Plate LV.)

The peculiar apparatus in the feet of Geckoes, by means of which these animals are enabled to run about securely upon smooth perpendicular surfaces, has often been referred to; and every one has observed the facility with which the common house-fly and many other species of insects can walk upon the ceiling of a room; but the occurrence of analogous climbing-organs in some species of Mammals is not generally known, or, at least, has been but imperfectly described in two instances only—namely, in *Hyrax*, and in the very remarkable species of Bat, *Thyroptera tricolor*, from Tropical America.

Several travellers have described the remarkable climbing-powers of the species of *Hyrax*, some of which live in holes in trees, upon



E. Smith del.
Mintern Bros. imp.

SUCTORIAL AND ADHESIVE FOOT-PADS OF MAMMALS.

the smooth perpendicular trunks of which they run up and down with as much security as if their feet were provided with sharp claws. In 'The Heart of Africa'[*], Dr. Schweinfurth has given a most interesting account of the habits of one of the species of this genus. He remarks:—"Abdoo, the controller of Mvolo, was half a naturalist; as a huntsman he had done service under many Europeans, and had acquired a reputation of being a skilful stuffer of birds. He drew my particular attention to the good sport afforded by the Rock-rabbits as they crept about in tempting proximity to the gate of the Seriba. At the same time he asked if I could account for the wonderful way in which the animals managed to clamber up and down smooth rocks that were almost perpendicular. 'I can't tell,' he said, 'how it is; but when you have shot one of the creatures, and catch hold of it, it sticks to the rock with its feet in its death-struggles, as though it had grown there.' The underpart of the foot is dark and elastic as india-rubber, and has several deeply indented cushions. This arrangement, which no other Mammalia or warm-blooded animals seem to possess, enables the creature, by opening and closing the centre cleft, to throw off part of its weight, and to gain a firm hold upon the smooth surface of the stone. The toes are nothing but pads of horny skin without regular nails, the hind foot being alone furnished on the inner toe with one claw, which is sharply compressed. For some time I could not at all comprehend how, with such a plump foot, the Rock-rabbit could climb so safely over precipitous walls of granite, or even along the polished branches of the little trees in the ravines; but the mystery was solved when I tried to pick up an animal which I myself had wounded. The granite was smooth as pavement; and yet, when I seized the creature by the neck, it clung like birdlime to the ground, and required some force before it could be removed."

The very peculiar feet of *Hyrax* were first described by Bruce[†]; and as his description is the most complete that has been taken from the animal in its native country, I think it necessary to quote it here in full. Of the Askoko of Abyssinia (probably *H. abyssinicus*) he writes as follows:—"This curious animal is found in Ethiopia, in the caverns of the rocks, or under the great stones in the Mountain of the Sun behind the queen's palace at Koscam. It is also frequent in the deep caverns in the rocks in many other places in Abyssinia. It does not burrow or make holes as the rat and rabbit; nature having interdicted him this practice by furnishing him with feet the toes of which are perfectly round and of a soft pulpy tender substance; the fleshy parts of the toes project beyond the nails, which are rather broader than sharp, much similar to a man's nails ill grown. His hind foot is long and narrow, divided with two deep wrinkles or clefts in the middle, drawn across the centre, on each side of which the flesh rises with considerable protuberancy; and it is terminated by three claws (? toes): the middle one is the longest.

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[*] Vol. i. p. 385.

[†] 'Travels to discover the Source of the Nile in the years 1768–73,' vol. v. description of pl. 24.

The fore foot has four toes, three disposed in the same proportion as on the hind foot; the fourth, the largest of the whole, is placed lower down on the side of the foot, so that the top of it arrives no further than the bottom of the toe next to it. The sole of the foot is divided in the centre by a deep cleft like the other; and this cleft reaches down to the heel, which it nearly divides. The whole of the fore foot is very thick, fleshy and soft, and of a deep black colour, altogether void of hair, though the back or upper part of it is thickly covered, like the rest of its body, down to where the toes divide."

"The centre cleft" of Dr. Schweinfurth appears to be the groove represented in Plate LV. fig. 9, and Fig. A, which passes backwards from a slight concavity in the centre of the sole of the foot and divides the heel. I am unable to feel equally satisfied with that distinguished traveller that the simple acts of opening and closing that cleft or any cleft in the foot are sufficient to enable the animal "to throw off part of its weight and to gain a firm hold upon the smooth surface of the stone." In the ordinary condition of the foot, the central concavity is evidently not of sufficient depth or extent to cause the strong adhesion of the sole to the rock as described. I believe that the source of this remarkable adhesive power may be traced in the general structure of the extremities.

Through the kindness of Prof. W. H. Flower, I have been enabled to examine the structure of the extremities in a specimen of *Hyrax dorsalis* preserved in alcohol in the Museum of the Royal College of Surgeons; and the valuable treatises on the myology of *Hyrax capensis* by Messrs. Murie and Mivart and by Prof. J. F. Brandt have afforded me great assistance in my examination.

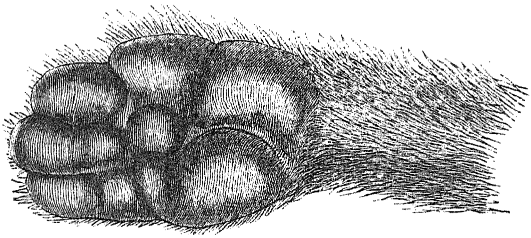
Hyrax dorsalis may be taken as a representative of that section of the genus in which the climbing-powers are, apparently, most developed, the animals of this species inhabiting holes in trees, on the vertical stems of which they run up and down with the greatest facility. The habits of the species of this section suggested the subgeneric name *Dendrohyrax*.

In the specimen of *Hyrax dorsalis* examined by me the soles of the feet had become quite hard and rigid from the action of the alcohol in which it was preserved; but prolonged immersion in solution of cyanide of potassium almost restored them to the original soft condition, which we know (from Bruce and Schweinfurth's descriptions made from examination of the living animal in its native country) is the normal state of the sole of the foot during life.

In all climbing four-footed animals the anterior extremities perform by far the most important part in maintaining their hold; and the species of *Hyrax* form no exception to this rule.

The fore foot has five toes (one, the pollex, being rudimentary and concealed beneath the skin); the hind foot three only (Plate LV. fig. 9). The toes are united as far as the bases of the terminal phalanges; the outer toe of the fore foot is united along its whole length. The nails are flat and short; and beyond them the soft extremities of the toes project, except in the case of the inner toe of the hind foot, which is armed with a small blunt hoof-like claw placed on the upper and outer side of the toe, next the middle toe, its projecting outer margin being received into a deep groove in the side of the middle toe when the toes are approximated (Plate LV. fig. 9, and Fig. A).

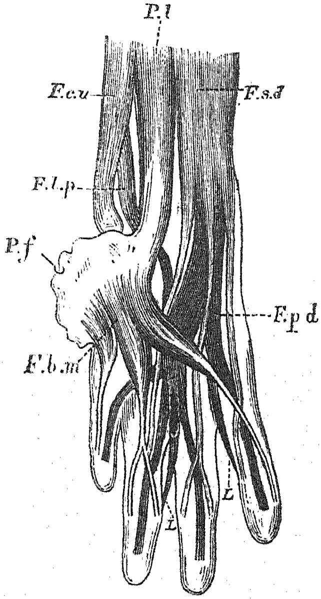
Fig. A.



Sole of foot of *Hyrax dorsalis.*

The transverse clefts in the sole of the foot, described by Bruce and Schweinfurth (and shown in fig. A), correspond simply to

Fig. B.



Flexor muscles and tendons of the fore foot.

P.l, palmaris longus; *F.c.u*, flexor carpi ulnaris; *F.s.d*, flexor sublimis digitorum; *F.p.d*, flexor profundus digitorum; *F.l.p*, flexor longus pollicis; *P.f*, palmar fascia; *F.b.m*, flexor brevis manus; *L*, lumbricales.

the lines of flexion indicating the position of the joints of the toes, and the longitudinal cleft dividing the heel to the groove along which the tendons of the flexor muscles enter the sole of the foot; but the great depth and extent of these grooves evidently allow of very free motion in the sole during flexion and adduction, the importance of which will be seen when we investigate the mechanism on which the adhesive power of the foot depends.

There is nothing therefore in the structure of the sole of the foot alone which can explain the extraordinary power of clinging to smooth surfaces which we know the species of *Hyrax* possess.

In dissecting the flexor muscles of the forearm the comparatively very large size of the *palmaris longus* is particularly noticeable (Fig. B, *P.l*). This muscle, arising from the internal condyle of the humerus and from the intermuscular fascia, forms a broad and strong tendon which, passing into the sole of the foot, spreads out into the palmar fascia, which contains a fibro-cartilaginous disk. From the superficial and deep palmar fascia, and from this fibro-cartilaginous disk, arises a very peculiar muscle (first described by Messrs. Murie and Mivart*), the *flexor brevis manus* (Fig. B, *F.b.m*), which is inserted by three tendons into the second, fourth, and fifth toes. The tendon going to the second, or inner toe, is inserted on the inner side of the tendon of the *flexor profundus*, while that going to the fifth or outer toe is inserted on the outer side of the tendon of the same muscle; the middle tendon forms, with the corresponding tendon of the *flexor sublimis*, the perforated tendon of the fourth toe; and as this toe is so much longer than the second and fifth toes, the positions of the insertions of the three tendons of the *flexor brevis manus* occupy nearly the same line across the foot.

If we take a line drawn along the middle of the fore foot from the centre of the carpus to the extremity of the third toe as the centre line of the foot, we find the insertions of the *flexor brevis manus* on either side of this line, two of the three tendons being inserted at points on opposite sides of the foot furthest from the centre. The action of this muscle must therefore be, not only to flex the outer and inner toes, but also to rotate them slightly and draw inwards both sides of the foot towards the centre line. In this action the tendency to cup the sole of the foot is evident. Further, as the *flexor brevis manus* arises from the palmar fascia, it follows that this muscle can only act effectively when its point of origin is fixed; and this is accomplished by the action of the strong *palmaris longus*, which, as we have seen, terminates in the palmar fascia. In the co-ordinate action of these two muscles on such a foot provided with a soft elastic sole and united toes we have, I believe, all that is necessary to produce the remarkable power of adhesion of the foot to any smooth surface on which it may be placed, which has been observed in most species of *Hyrax*.

The *palmaris longus*, in fixing the palmar fascia, removes the pressure of the centre of the sole of the fore foot, while the soft elastic sides and heel are in close contact with the surface on which the animal is walking; at the same time the *flexor brevis manus* elevates the greater part of the anterior half of the sole by pressing the extremities and sides of the outer and inner toes downwards and also drawing them towards the centre line of the foot, thus producing a condition of the sole of the foot analogous to the sucking-cup of a cephalopod.

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* *L. c.* p. 341. Messrs. Murie and Mivart (with the sanction of the Council of the Society) have kindly permitted me to make use of one of the wood blocks (Fig. B) from which the illustrations accompanying their paper were printed.

In the hinder extremities the same conditions are fulfilled, though evidently much less effectively. The homologue of the *palmaris*, the *plantaris*, is also very large, and arises from the external condyle of the femur; and its tendon similarly passes into the sole of the foot to form the plantar fascia from which the *flexor brevis digitorum* arises as the *flexor brevis manus* in the fore foot.

The softness and elasticity of the sole of the foot (described by Bruce and Schweinfurth) permit of nice adaptation to slightly uneven surfaces, and render the suctorial action, by which cohesion is maintained, possible. As it appeared evident to me that this soft condition of the sole must depend not only on large development of the subcutaneous areolar tissue, but also on a permanently moist state maintained by the secretions of numerous sudorific glands, I was not surprised to find, on examining several horizontal and vertical sections of the integument of the sole of the foot, that the sudorific glands were exceedingly numerous, at least fifteen times as numerous in a given space as in the sole of the human foot, amounting to 40,000 in the square inch*.

With such an enormous number of sudorific glands the sole of the foot is doubtless kept constantly moist, and in the most favourable condition for adhering to smooth or slightly uneven surfaces, when it is converted into a kind of suctorial disk by the action of the muscles as described above.

It might appear strange that, with such a soft sole to the foot, the animal could run with impunity over hard and occasionally angular surfaces; but I find that the sole is everywhere protected by a deep layer of epithelium, in no place less than $\frac{1}{25}$ of an inch in thickness. The importance of the great number of sudorific glands is here again apparent; for, with such a deep layer of epithelium, the sole of the foot would soon become quite horny from the effects of constant pressure, were it not not kept constantly moist by an abundant glandular secretion†.

In the very remarkable species of Bat, *Thyroptera tricolor*, first described by Spix‡, we find the only known instance (in Mammalia) of the presence of prehensile organs resembling the sucking-disks of Cephalopoda. On the inferior surface of the thumb, from the base of the first phalanx, and from the sides of the metacarpo-phalangeal joint, corresponding to the position of the ball of the thumb in other Bats, arises by a short peduncle a circular hollow suctorial disk about one tenth of an inch in diameter (Plate LV. fig. 5, enlarged). On the sole of the foot a similar but considerably smaller disk (fig. 6) is placed, not in the same relative position, however, as on the thumb; for it covers the metatarsal bones, not the bases of the first phalanges of the toes.

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* I have arrived at this calculation from observing that sometimes five, but more frequently four of the openings of the sudorific ducts were contained within a measured space equal to the square of $\frac{1}{100}$ of an inch. If, therefore, we assume four as the average number in this space, it follows that exactly 40,000 are contained within a square inch.

† The significance of the *retia mirabilia* in the extremities of *Hyrax*, first described by Hyrtl, will be at once understood when we consider how necessary it is to maintain a constant vascular condition of the foot in order to keep up the abundant secretion poured forth by the numerous sudorific glands.

‡ Simiar. et Vespert. Brasil. 1823, p. 61, pl. xxxvi. fig. ix.

In a paper published in the 'Boletin revista de la Universidad de Madrid,' by Señor Jimenez de la Espada, a member of the Spanish Expedition to explore the natural productions and physical conditions of South America, the author relates his observations on the habits of this species, and describes the sucking-cups. I have not been able to procure a copy of this paper; but fortunately a full abstract of the part relating to *Thyroptera tricolor* is given in the 'Zoological Record' for 1870, as follows:—

"The sucking-cups consist of a coriaceous disk; they are little hemispheres, hollow, flexible, and extremely movable, on the first phalanges of the thumbs of the wings and near the heels on the soles of the feet. They were used by the animal to fasten itself to the fingers as it tried to bite, producing the same feeling as a key or thimble when applied to the tongue after sucking out the air. These cups are deep, membranaceous on the edge, fleshy in the centre, those on the wings larger than those on the feet. The muscular arrangement is such as to allow the animal to vary the diameter of the organ; and by their means the animals attached themselves to the sides of the box in which they were kept, although, when sleeping, they suspended themselves by the claws like other Bats."

With the latter part of the above statement, referring to a muscular arrangement in a sucking-disk, I am quite unable to agree. Microscopical sections of the disk made in every direction failed to exhibit the slightest trace of muscular fibre; and I believe that the animal does not possess the power of varying the diameter of the organ by direct muscular agency. Indeed the presence of a muscular arrangement in the sucking-disk of *Thyroptera tricolor*, such as Señor Jimenez de la Espada refers to, would be a most remarkable anomaly; for this species would possess special muscles of which not the slightest homologue could be found in any other vertebrate animal. But nature does not form complicated organs where simple ones are equally or sufficiently effective. The remarkable sucking-cups of *Thyroptera* are evidently but highly differentiated conditions of the integuments and superficial fascia of the balls of the thumbs and soles of the feet. This is shown by their position, by their structure, and by the presence in other Bats of analogous conditions of the same parts, which must be also considered homologous.

In *Vesperugo nanus*, Ptrs., *V. tylopus*, Dobson (Plate LV. figs. 1 & 3), and especially in *V. pachypus*, Temm. (fig. 2), the sole of the foot is very broad, slightly concave, and almost circular in outline, so much expanded as to project considerably beneath the toes. The toes are very short and have feeble claws. The ball of the thumb covering the metacarpo-phalangeal joint is also much expanded and flattened. This remarkable condition of the sole of the foot and of the thumb is seen, on examination by the microscope, to be due to the great development of the integument and areolar tissue. In these Bats the feet are undoubtedly adhesive, enabling them to walk on smooth hard surfaces, where the claws could afford but slight aid in progression; but the adhesive power is evidently much inferior to that possessed by *Thyroptera*; nevertheless the difference in structure between the comparatively simple adhesive sole of the foot and thumb of *V. pachypus*, and the highly differentiated sucking-cups of *T. tricolor* is one of degree only.

The walls of each cup are composed, from without inwards, 1, of skin (continuous with the integument of the thumb); 2, of a middle layer of connective tissue with cartilage cells and glandular tissue; and, 3, of a thin epithelial layer lining the concavity of the cup, having on its surface the openings of glands, which are most abundant near the margin of the disk. The middle layer at the base of the cup, for a short distance around the point of its connexion with the short pedicle which attaches it to the thumb, consists almost entirely of cartilage cells, which soon become considerably thinned out and replaced by another form of connective tissue. This connective tissue, which forms the greater part of the walls of the suctorial disk, lying (as already described) between an outer and inner* layer of integument, appears to consist of two layers, that lying next the external integument being very dense and having a few cartilage cells, while the inner layer lying next the thin epidermis lining the cup consists of rather broad fibres radiating from the cartilaginous base of the cup towards its circumference, and which cause a corresponding radiating appearance in the cuticle lining the concavity of the cup (see Plate LV. fig. 5).

These radiating fibres no doubt suggested to Señor Jimenez de la Espada the idea of a muscular apparatus; but, as I have already remarked, no trace of muscular tissue can be detected in them or in any other part of the disk. They are about $\frac{1}{1100}$ of an inch in diameter and extend from the cartilaginous base of the disk outwards to within a short distance from its free margin, being separated from each other by a thin layer of connective tissue derived from the outer part of the middle layer. Examined under high powers and with an immersion-lens, they appear solid and almost structureless†. Although they do not present the characters of ordinary elastic tissue, they are, I believe, elastic, and must be considered a modified condition of the *corium* of the sole of the foot, their form being dependent on the direction in which the stretching force acts when the edge of the disk is fixed.

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* The terms "outer" and "inner," used with reference to the suctorial disk, refer to its convex and concave surfaces, which I here, for convenience, consider its outer and inner sides respectively.

† Prof. Turner has kindly examined these radiating fibres for me; he says:—"With careful focusing I think that I can recognize traces of structure in each fibre; there are appearances of very minute elongated nuclei, such as one sees in tendon. . . . . . I am disposed, on the whole, to regard them as a modification of connective tissue, though not elastic." Prof. Turner means by this that they do not present the characters of what is commonly known as elastic tissue.

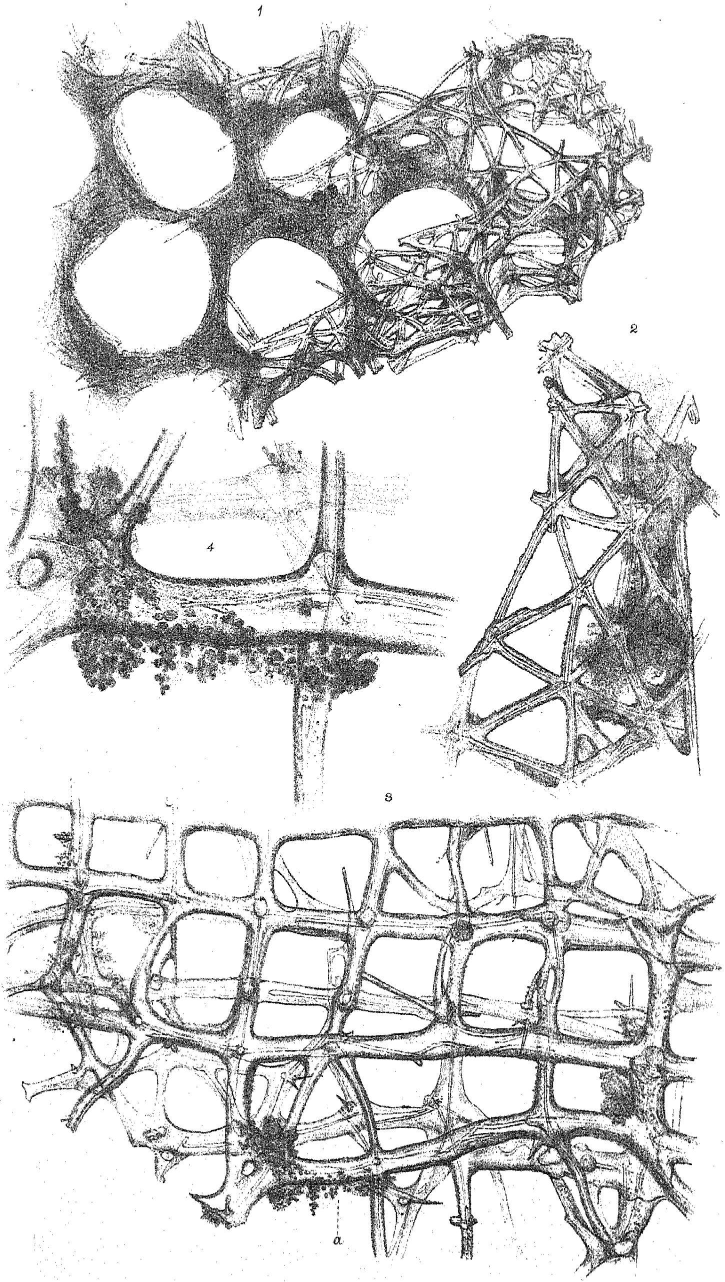
The circular rim of the suctorial disk is composed of the free margins of the outer and inner layers of integument (homologous respectively with the integument covering the sides and soles of the foot in other Bats) which together form a flattened elastic ring (as shown in Plate LV. fig. 5), which, moistened by the secretions of the sudorific glands opening on the concave surface of the disk, fits accurately to any smooth surface on which it may be placed. The simple action of throwing the weight of the body on the base of the cup while its circular rim is applied to any smooth surface, is sufficient to fix it there; for the integumentary layers and connective tissues of which it is composed are thereby stretched, and its concavity increased in depth, thus causing a partial vacuum.

That these suctorial disks are not always sufficient alone to enable the animal to climb is shown by the presence of small projections from the posterior margin of the calcaneum (Plate LV. fig. 6), which evidently are used to assist the foothold when climbing. In no other species have I observed similar projections; and this is another peculiarity in which this remarkable species differs from all other Bats.

In *Mystacina tuberculata* (of which several peculiarities have been described by me in a preceding paper, see above, p. 486) the sole of the foot is formed of deeply wrinkled very lax skin, which also extends along the inferior surface of the flattened and short legs (Plate LV. fig. 7). The toes, in the arrangement of the integument, present a remarkable resemblance to those of *Hemidactylus* (comp. fig. 8). Each toe is divided by a central groove, from which smaller transverse grooves proceed outwards to the margins. As I have shown (in the paper referred to), the whole external structure of this species is peculiar: the wings and interfemoral membrane are folded away beneath a portion of the membrane along the sides of the body, which is specially thickened, and forms a protective case as perfect as the elytra of a coleopterous insect, with which it is, indeed, strictly analogous; the extremities are very strong, and the claws armed with basal denticles (Plate LV. fig. 7 *a*), so that this species is the most quadrupedal of Bats, and also the most fitted for climbing among all the known species of Chiroptera (except perhaps *Thyroptera tricolor*). Undoubtedly the sole of the foot and under surface of the leg are specially modified in relation to the habits of the animal, assisting it most materially in clinging to smooth surfaces where the claws are unable to penetrate sufficiently deep.

EXPLANATION OF PLATE LV.

Fig. 1. Foot of *Vesperugo nanus*, Ptrs.
  1 *a*, 4 *a*. Thumb of ditto.
  2. Foot of *V. pachypus*, Temm.
  2 *a*, 5 *a*. Thumb of ditto.
  3. Foot of *V. tylopus*, Dobson.



Deanea favoides 1-

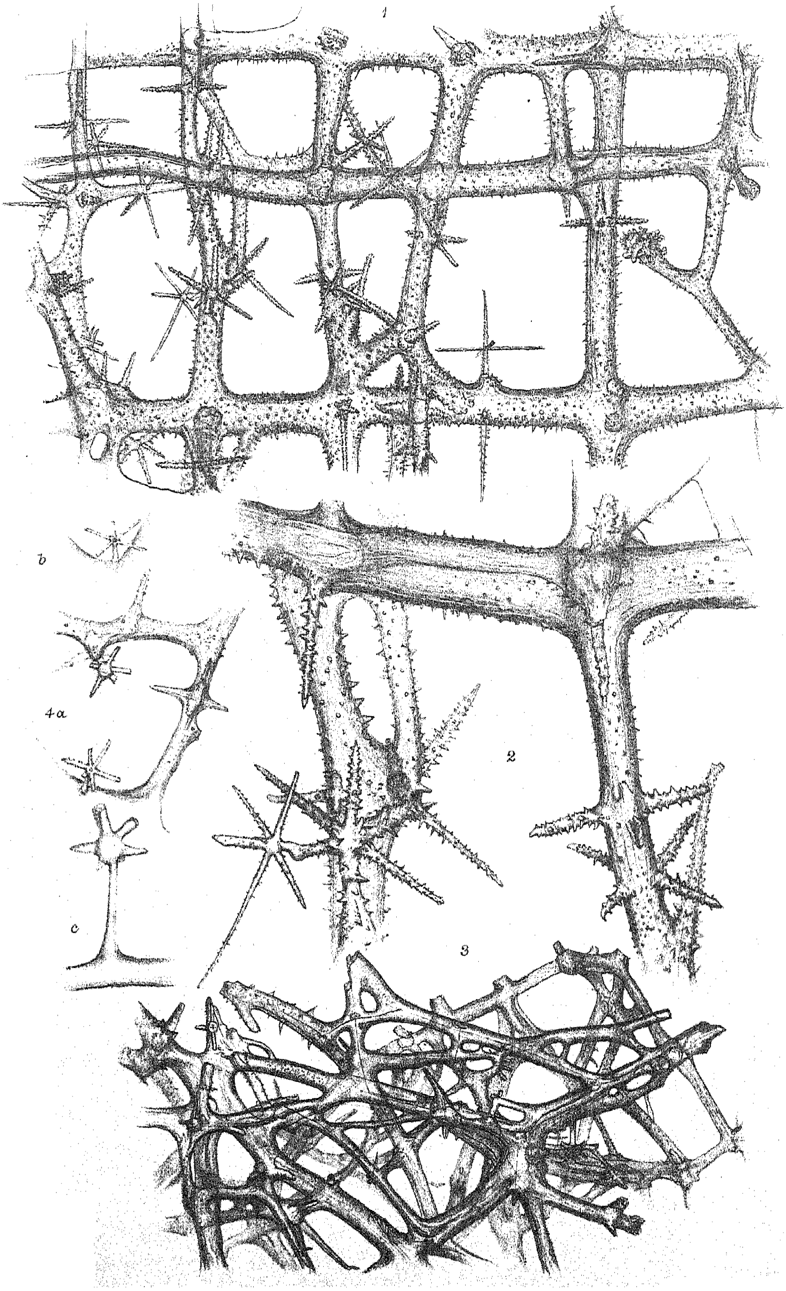

1
b
4a
2
c
3

Fig. 3 *a*, 6 *a*. Thumb of ditto.
4, 5. View of side and concave surface of suctorial disk of *Thyroptera tricolor*, Spix.
6. Foot of *T. tricolor*, with suctorial disk, also calcaneum with projections from its posterior margin.
7. Foot and part of the inferior surface of the leg of *Mystacina tuberculata*, Forst.
7 *a*. Thumb of *M. tuberculata*, showing denticle at base of claw.
8. Foot of *Hemidactylus coctæi* (Geckotidæ).
9. Hind foot of *Hyrax dorsalis*.

2. A Monograph of the Siliceo-fibrous Sponges. By J. S. Bowerbank, LL.D., F.R.S., F.Z.S., &c.—Part VI.

[Received May 31, 1876.]

(Plates LVI. & LVII.)

Deanea favoides, Bowerbank. (Plate LVI. figs. 1, 2.)

Sponge laminar or cup-shaped, thin, resembling a thin section of a honeycomb. Surface even. Dermis thin, translucent, aspiculous. Oscula and pores unknown. Skeleton symmetrical, rotulate; rotulæ confluent; fibres cylindrical; central canals large and very distinct. Sarcode dense, opaque, amber-coloured.

Colour, in the dried state, dark amber.

Hab. West Indies? (*Captain Hunter*?).

Examined in the dried state.

This is a remarkably constructed sponge. It consists of a very open reticulate structure, closely resembling a thin slice of the cells of the comb of the honey-bee taken at right angles to the long axis of the cells. The parietes of these large open areas are constructed of a confluent rotulate rete of the same form as that of the skeleton-structure of *Deanea virgultosa*, described in the Society's 'Proceedings,' 1875, p. 275; and, as in that species, the fibres are all canaliculated and confluent, but the canals are not quite so strongly produced. The external surface and open spaces of the sponge do not appear to be covered with a continuous dermal membrane; but it covers the interstices of the rotular areas of the skeleton rete, and is in those parts thickly coated with a dense and nearly opaque layer of sarcode.

The dermal membrane appears to pass inward and to line the interior of the large open spaces of the skeleton-structure; and in no instance could I find even a fragment of the membranous and sarcodous structures projected into the large open areas of the sponge, although upon their parietes it is in a perfect state of preservation. We may therefore reasonably infer that in a living state these great orifices are in an open condition.

The dermal surface is quite smooth; and a comparatively thick dense stratum of dark sarcode intervenes between the dermal membrane and the siliceous skeleton.

I have no certain record of the habitat of this species; nor am I certain to whom I am indebted for the specimens. It is probable that I received them among other specimens of siliceo-fibrous sponges from my late friend, Mr. Henry Deane; and if so, its locality may be the same as that of *D. virgultosa*; and I have a strong suspicion that the remains of the sponge in course of description should be referred to that species. The skeleton-structure is identical with that from the solid stem of *D. virgultosa*, which may very probably have been the stem of a perfect specimen of *D. favoides*, presuming that sponge to have been cup-shaped and elevated on a pedestal. I have three fragments of *D. favoides*, apparently from the same individual, neither of which exceeds three lines in diameter; and they exhibit very faint traces of curvature; so that if they have been portions of a cup-shaped sponge, it must have been of considerable size—and are probably portions of its distal margin, as the pieces all agree in their general character, and no indications of approximation to the base of the cup is apparent in either of them.

In the specimen of *D. virgultosa* the fibres of the rete of the stalk-like specimen are rather stouter than those in *D. favoides*; but in other respects there is a remarkably close similarity. If the former should hereafter prove to have been the stalk or pedestal of a cup of the latter species, this slight difference might naturally be expected to occur.

Another strong indication of the close alliance of the two species exists in the peculiarities of their sarcode, which in both is extremely dark and opaque. In *D. favoides* it is very abundant; but a very small portion remains attached to the small fragment of *D. virgultosa* in my possession.

Under all the circumstances of the case I have thought it advisable to designate them as separate species, until further information enables us to decide the question.

FARREA INERMIS, Bowerbank. (Plate LVI. figs. 3, 4.)

Sponge cup-shaped? Dermal surfaces furnished with a quadrilateral, smooth, or rarely incipiently spinous siliceo-fibrous network, rarely armed at its angles externally with short, stout, imbricated, conical, spicular defences. Areas square or slightly oblong, regular; sides of the areas very rarely armed with long and slender acutely conical spines. Fibres of the dermal rete cylindrical, nearly equable in diameter, canaliculated irregularly. Dermal membrane thin and pellucid, aspiculous. Internal skeleton—rete indistinct and very irregular; fibres slender, occasionally slightly furnished with minute conical spines; gemmules spherical, smooth, membranous, aspiculous, dense and opaque.

Colour, in the dried state, dark amber.

Hab. West Indies? (*Captain Hunter*).

Examined in the dried state.

I received the only specimen of this sponge that I have seen, from my late friend Mr. Henry Deane, among several other species of siliceo-fibrous sponges, without any special account of its locality;

but as it was accompanied by several others obtained by Captain Hunter from the West-Indian Seas, I think it is highly probable that is is from the same locality. It is a fragment, eight lines in length by six in width, of a thin plate of sponge. It is slightly curved at right angles to the primary fibres of the skeleton, which radiate slightly from one end of the sponge; and from these indications it is probable that it has formed a portion of a cup-shaped sponge, and probably a rather widely expanded one. A few patches of the dermal membranes remain adhering to the skeleton-fibres; they are thin and delicate in structure, and many of them are slightly coated with dark amber-coloured sarcode, and not the slightest remains of retentive or other spicula could be detected upon any of them.

The primary fibres of the skeleton run in nearly parallel lines in the direction of the greatest length; and the secondary ones are disposed at right angles to the primary lines, causing the areas of the skeleton-rete for the greater part to be uniformly square, comparatively a few only being slightly oblong. The secondary lines of the exterior and interior surfaces of the sponge are very slightly less in diameter than the primary ones; and there are straggling portions of an intermediate layer of fibres, which are few in number and very much more slender than any portions of the external layers. Both the primary and secondary lines of the two outer surfaces of the skeleton are very smooth; on some portions of their fibres no indication of spines can be detected, while on others the faintest possible indications of them are perceptible; but on some of the straggling intervening portions they are much more decidedly produced. On the external or inhalant surface of the sponge there are a few well-produced short stout imbricated conical spicular defences, based on some of the angles of the rete; but they are of comparatively rare occurrence, and I could not detect them on the inner or exhalant surface. There are also a few long slender conical defensive spines projected from the skeleton-fibres into the interstitial spaces of the sponge; but, on the whole, the armature of the skeleton-tissues is very meagre, and it requires a linear power of not less than about 100 to render these characters distinctly to the eye.

The canaliculation of the skeleton-fibres is very unequal and irregular; and they appear to be often projected in opposite directions; and their cæcoid terminations frequently pass each other without uniting.

Minute fragments of the interstitial membranes are seen adhering to some of the skeleton-fibres; they are thin and delicate in structure; and some of them are slightly coated with dark amber-coloured sarcode; and not the slightest remains of retentive or other spicula could be detected upon any one of them.

The gemmules appear to have been very abundant in this sponge, as there are several groups of them attached to the skeleton-fibres, each containing a considerable number closely packed together. They are membranous and smooth, and apparently aspiculous, but so opaque that their contents cannot be seen. They vary slightly in size; their average diameter measured $\frac{1}{1200}$ inch.

I have compared the structures of this sponge with other nearly allied species without being able to assign it to any one of them. From the paucity of its armature I have designated it, specifically, *inermis*.

FARREA PERARMATA, Bowerbank. (Plate LVII. figs. 1, 2.)

Sponge cup-shaped? Surface even. Oscula and pores unknown. Dermal system reticulated; primary and secondary fibres cylindrical, disposed at right angles to each other. Areas of the rete mostly quadrilateral, occasionally oblong; fibres profusely furnished with minute conical spinules; canals of the fibres obsolete; areas of the rete frequently furnished at their angles, both at the external and internal surfaces of the inhalant surface, with large imbricated conical defensive organs, frequently terminated with rectangulated sexradiate organs of defence; also with numerous separate slender rectangulated sexradiate defensive organs and single long and slender spinulated spines, based on the skeleton-fibres, and occasionally with rather long and slender attenuated spines based on the fibres between their angles in cruciform arrangement. Nearly all the defensive organs more or less spinulous.

Colour unknown.

Hab. West Indies (*Captain Hunter, R.N.*).

Examined in the dried state.

The only specimen I have seen of this sponge is a fragment of what has apparently been a portion of a very delicate siliceo-fibrous cup. It is seven lines in length and five lines broad. I am indebted to my friend, Mr. J. Deane, for my possession of it. It was received, with other siliceo-fibrous specimens of Sponges, from Captain Hunter by my late friend, Mr. Henry Deane, of Clapham. The fragment is slightly curved in one direction, inducing the belief that it has formed a portion of the sides of a rather expansive cup-shaped sponge.

There are not the slightest remains of either membranous structures or of sarcode on any part of the well-washed specimen. The skeleton of the sponge only remains; but this is fortunately remarkably characteristic.

The primary and secondary lines of the skeleton are nearly or quite equal in size, and they are generally disposed at right angles to each other, so that the areas are usually square or more or less oblong. All parts of the skeleton-rete are profusely and rather regularly furnished with minute conical spinules; and not the slightest indication of the presence of central canals could be detected in any part of the skeleton-structures.

The angles of the skeleton-rete, both externally and internally, are frequently armed with stout imbricated conical defensive spines, which are occasionally terminated by slender more or less perfect rectangulated sexradiate defensive organs, which are rarely quite smooth, but more frequently amply supplied with minute conical spinules. The rectangulated sexradiate defensive organs are also often projected from the skeleton-fibres without the intervention of the large imbricated spines, and they are then generally based on the skeleton-fibres at some point between two of the angles of the skeleton-rete. In other cases four long slender spines are projected in opposite directions from the skeleton-fibres, so disposed as to form a symmetrical cross. In fact, there appears to be no end of variations in the form and mode of disposition of these defensive organs; and they are at the same time exceedingly numerous and very irregularly distributed. At some parts they are disposed singly at intervals, while in other parts a considerable number are congregated within a small space.

Although the discriminative characters in the specimen of this sponge are in this instance so few in number, they are fortunately so striking, and so different from those of other nearly allied species, that there will be little difficulty hereafter in recognizing the species in a more perfect condition by the peculiar specific characters afforded by the skeleton and its elaborate system of armature.

FARREA IRREGULARIS, Bowerbank. (Plate LVII. figs. 3, 4.)

Sponge laminar, cup-shaped? Surface even. Oscula and pores unknown. Dermal membrane thin, aspiculous. Skeleton siliceo-fibrous; fibres cylindrical, irregular in size; rete occasionally rectangulated, but more frequently irregular; central canals very slender, often obsolete. Interstitial defences rectangulated sexradiate, few in number, very small. Sarcode dark, opaque, aspiculous.

Colour, in the dried state, dark amber.

Hab. Algiers (*Mr. Henry Deane*)..

Examined in the dried state.

The only specimen that I have seen of this species is a thin plate of it, eight lines in length by five in breadth, which, from its slight curvature in one direction, has apparently formed part of a cup-shaped sponge. I am indebted to my friend Mr. Charles Tyler for it; and he informed me that it was presented to him by our late friend Mr. Henry Deane, and that its habitat was Algiers.

The structures of the dermal surface are even, but much complicated; and the intervening skeleton-tissues to a great extent have the same character.

A few very minute portions of the dermal and interstitial membranes remained, upon each of which there is a thin film of dark amber-coloured sarcode; but I could not, with a power of 100 linear, discover the slightest remains of retentive or defensive spicula upon any of them. Small irregular dense masses of opaque sarcode are adherent to some portions of the interstitial skeleton; but they also appeared to be quite destitute of retentive spicula.

The configurations of the skeleton of both the inhalant and exhalant surfaces are very irregular in the mode of the disposition of their skeleton-structures; and the fibres also of which they are composed are very unequal in size. For small spaces the rete sometimes assumes a quadrangular form; but the more general mode is very irregular.

The skeleton consists of several layers of reticulate structure; but the intermediate portions between the inhalant and exhalant surfaces are so completely intermingled that it cannot be determined with certainty how many of them there are. The fibres also of which they are composed are very variable; some of them, and especially the largest ones, are nearly quite destitute of minute spinules, while others of small diameter abound in them in an incipient state of development. The central canals of the fibres are also very irregularly developed: in some parts they are obsolete; in others they are visible, but are of extreme tenuity; they rarely appear continuous for any distance; and frequently they terminate abruptly. The same irregularity is apparent with the interstitial defensive organs. A few single slender small attenuated spines are observable on the fibres of the skeleton, disposed at considerable distances from each other; they are very variable in size and mode of disposition. A few rectangulated sexradiate defensive organs are also present at considerable intervals. They are mostly very minute, requiring a power of about 200 linear to render them distinctly to the eye; and if of larger dimensions, they are often abnormal and distorted in form.

The prevailing irregularities in the structure of this species, in addition to the more positive specific characters, will readily separate it from other nearly allied species with which we are acquainted.

EXPLANATION OF THE PLATES.

Plate LVI.

Fig. 1 represents a portion of one of the pieces of *Deanea favoides*, exhibiting the dark sarcodous development of the skeleton on one part, and the denuded rotulate skeleton on the other portion, ×36 linear.

2. A small portion of the confluent rotulate skeleton of the specimen represented by fig. 1, showing the structure of the rotulæ and the central canals of the fibre, ×80 linear.

3. *Farrea inermis*: a portion of the skeleton, exhibiting its general structure and the paucity of its armature, and a small piece of its membranous structure, with numerous gemmules embedded upon it at *a*, ×36 linear.

4. The group of gemmules represented at *a*, fig. 3, ×80 linear.

Plate LVII.

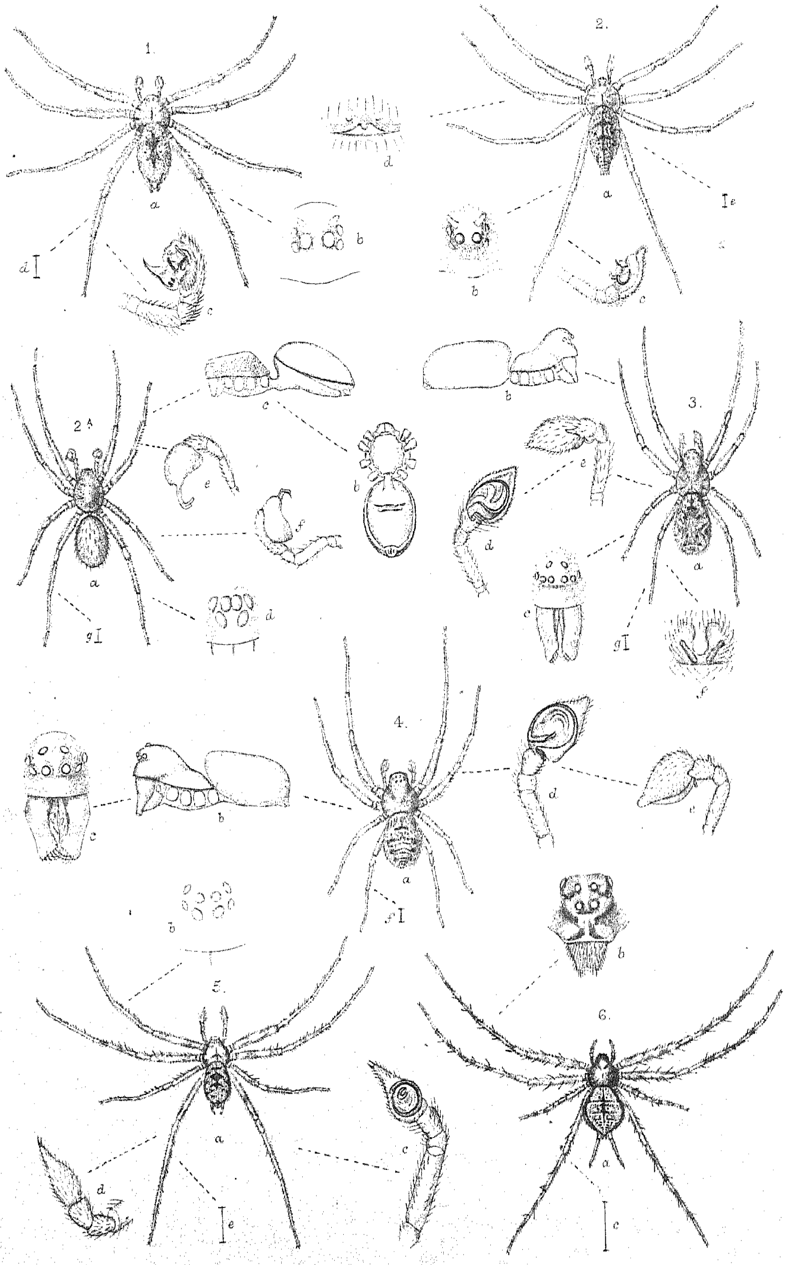
Fig. 1 represents a portion of the skeleton of *Farrea perarmata*, with the manner of the disposition of its abundant armature, ×61 linear.

2. A small portion of the specimen represented by fig. 1, exhibiting the structure of the defensive organs, ×123 linear.

3 represents a portion of the skeleton of *Farrea irregularis*, exhibiting the intricate and irregular structure of its rete, ×31 linear.

4, *a*, *b*, *c*. Examples of the varieties in size and of the distortions of form of the interstitial sexradiate defensive organs, ×123 linear.

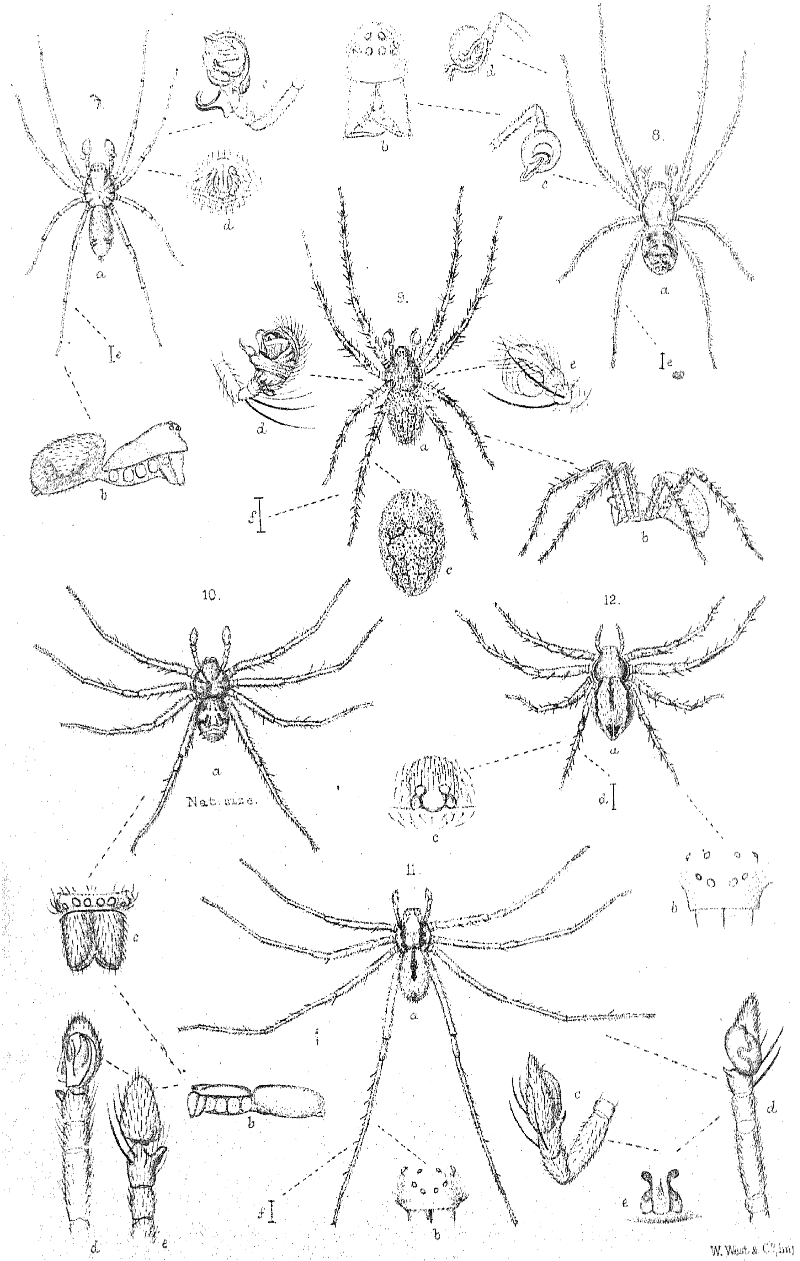
P. Z. S. 1876. Pl. LVIII.



A. T. Hollick del. et lith.

W. West & Co. imp.

Egyptian Spiders.

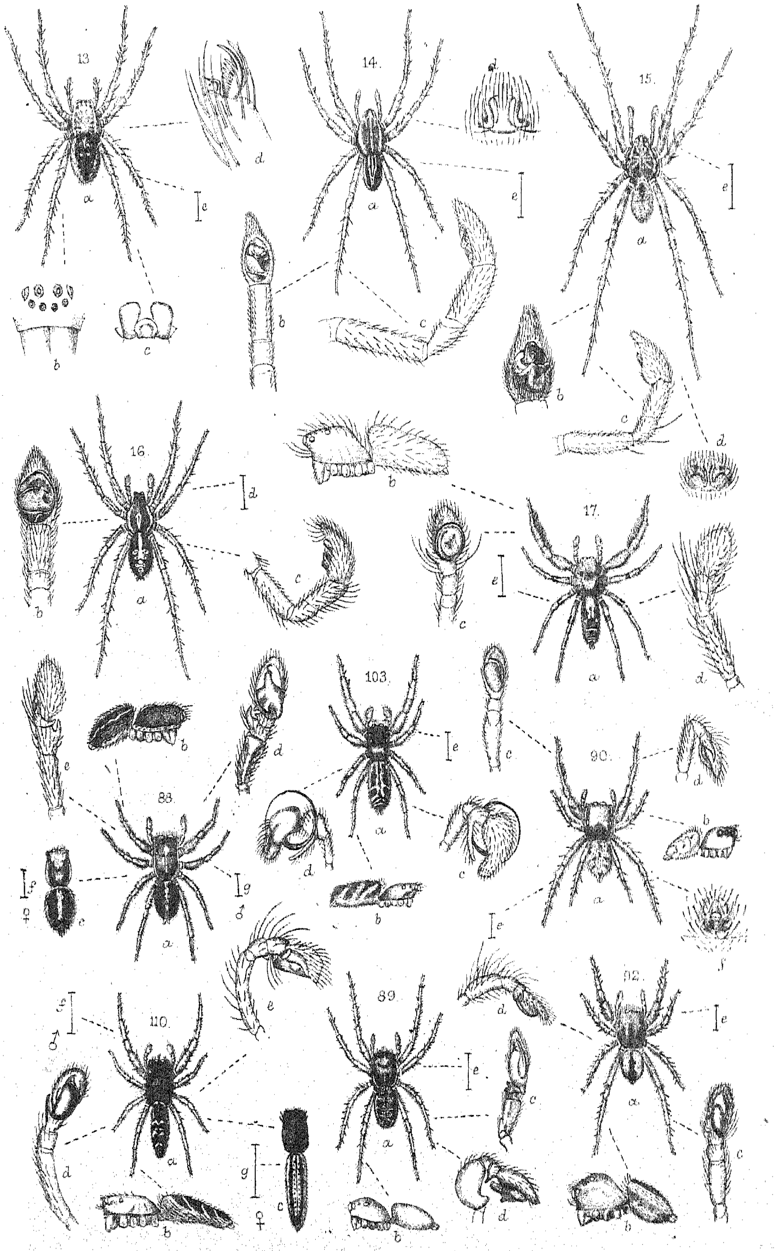


A. T. Hollick del. et lith.

W. West & Co. imp.

Egyptian Spiders.

P. Z. S. 1876. Pl. LX.



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3. Catalogue of a Collection of Spiders made in Egypt, with Descriptions of new Species and Characters of a new Genus. By the Rev. O. P. CAMBRIDGE, M.A., C.M.Z.S., and Hon. Memb. New-Zeal. Institute.

[Received May 31, 1876.]

(Plates LVIII.-LX.)

Since the time of Savigny, who, in conjunction with Audouin (A.D. 1809–13), figured and described about eighty-four species of Araneidea in his great work on Egypt, very little has been done in this particular branch of Egyptian zoology. The chief, if not all, of the later additions to the known Spiders of those regions are several species of Drassides (a portion of the present collection) published in the 'Proceedings' of the Zoological Society, 1872, pp. 224–247, and nineteen others of the same family and collection, likewise published in the Zoological Society's 'Proceedings,' 1874, p. 370 *et seq.* Dr. Ludwig Koch also records and describes, in 'Ægyptische und Abyssinische Arachniden,' Nürnberg, 1875, nineteen species of Araneidea, found near Cairo by Herr C. Jickeli. Egyptian entomology in general appears to have received comparatively little attention, considering the great number of tourists and naturalists who have visited the Nile during the last fifteen or twenty years. Probably this has arisen in a great measure from the superior attractions offered by the birds of that rich ornithological region; a strong and very decided love of Insects and Arachnids would be required to make these more attractive to most travellers than the numerous feathered tribes. There are regions of the world where the size, the number, and the beauty (or ugliness, as it may be) of the Insect and Arachnid orders almost oblige the most indifferent observers to note and collect them; but Egypt is decidedly not such a region. We have a strong proof of this in a lately published lecture on the Rambles of a Naturalist in Egypt, by Mr. J. H. Gurney, jun.; a notice before me of this lecture says, "Mr. Gurney briefly alluded to the entomology of the country, which appears to consist of fleas, flies, and mosquitoes." It would argue a tough skin, and indifference to entomology indeed, were a naturalist, or any other traveller, to pass over these without notice, so very close and persistent are their attentions; and perhaps more attention would be paid to entomology (in a wider sense) were their attentions rather less pertinacious. As it is, however, the "fleas, flies, and mosquitoes" are numerous and persistent enough to make it impossible to escape them, while others of this class (Spiders included) are comparatively scarce, and, generally speaking, so little attractive, from their usually small size and sombre colouring, as to require close observation and careful search to obtain any thing like a fair representation of their indigenous forms. Still any naturalist with good health and a love of the subject would find ample reward for any real work among the Insects and Spiders of the Lower Nile basin. My own work there during about eleven weeks, between the middle of January and the middle of April 1864, from Alexandria to Assouan, resulted in a collection of several hundred species of Insects of all orders, besides the 164 species of Spiders contained in the present list, as well as some few Acaridea and Scorpionidea. Rather more than one third of the Spiders belong to the two families Drassides and Salticides, these being also the two families even more numerously represented, absolutely as well as proportionally, in Syria and Palestine than in Egypt (see P. Z. S. 1872, p. 214). In those countries they comprise 117 species, or nearly one half of the Araneidea met with, while the numbers found in Egypt are 56. The dry and desert nature of both Palestine and Egypt are alike favourable to the development of the Drassides and Salticides; and many of the species are common to both countries. Suffering a good deal from climatic influences, I was unable to work very hard. Except for this and some other reasons, I feel no doubt but that the number of Spiders in my collection would have been nearly, if not quite, doubled; and if so, it is evident that there remains yet much to be done in order to exhaust the Egyptian species of this order. Of the total (164 species), 91 appeared to be new to science; 62 of these are now described for the first time, while the remainder (principally, as before mentioned, of the Drassides and Salticides) have been already described, P. Z. S. 1872 and 1874. One Spider alone in the collection appears to require the formation of a new genus for its reception, see p. 596. This Spider is of the family Lycosides, and is allied to the genus *Dolomedes*; it was found in a swamp near the canal about three miles from Alexandria.

Comparing the numbers of genera and families with those found in Syria and Palestine, their very near similarity is remarkable. 19 families, comprising 59 genera, are the numbers in the latter district, while those of Egypt are respectively 17 and 60. In the present list, however, the Latreillian genus *Salticus* is divided into eight generic (or subgeneric) groups; if this had been also done in the Palestine list, the number of genera would have been there 66 instead of 59; but even then the totals are remarkably near to each other. Comparing these results with those I have obtained in Great Britain (at present one of the best-, or perhaps the best-worked European district in respect to the Araneidea), we find here 78 genera distributed among 14 families, 4 South-European families being unrepresented. This comparison might have been extended to the results obtained in Sweden by M. Westring and Dr. T. Thorell, as well as in Italy by Dr. P. Pavesi, and in Algeria by Mons. H. Lucas; but it seems best at present to confine it to those results obtained by, as nearly as possible, an identical system of generic and family limitation, since a difference of system would necessarily produce a different result in regard to the numbers of families and genera. I should have liked to have been able to make a more certain collation of the Egyptian Spiders with those of

Algeria, inasmuch as, from the nature of their geographical and physical conditions, the faunas of Egypt and Algeria must have very much in common; my collection, however, of Algerian Spiders is too scanty for this purpose, and I have not been able to get access to any others. So far as I can make out with tolerable certainty, about eighteen species only of the following list appear to be identical with species found in Algeria. The determination, however, of closely allied species by means of descriptions and figures alone is very uncertain work; and thus I have in many cases hesitated to determine, from these alone, their synonymic identity. And so, again, in some instances I may perhaps have described as new, species already described by M. Lucas in his great Algerian work; but this, of the two, appears to me a less evil than that of including, as synonymic, species not certainly identified as similar.

A list is added to this paper of those Egyptian Spiders, so far as I have been able to ascertain them, not found by myself, but described and recorded by other authors. This considerably swells the number of known species, but adds nothing to the numbers of indigenous families and genera contained in my own list. Thus the total number of Egyptian Araneidea known to the present time appears to be 226.

Out of the 164 species found by myself, 29 are identical with species described and figured by Savigny and Audouin, and the numbers (of species of all genera) common to Egypt and Palestine are 48.

Order ARANEIDEA.

Family Filistatides.

Genus Filistata (Latr.).

FILISTATA TESTACEA.

Filistata testacea, Latr. Considérations, p. 12; Cours d'Entomologie, p. 512.

F. attalica, Koch, Die Arachn. v. p. 6, pl. 146. fig. 343; Cambr. Spid. Palest. & Syria, P. Z. S. 1872, p. 216.

Adult females and a single adult male of this species were found in crevices of the bark of palm and other trees, and in the interstices of old walls, near Alexandria and in several other parts of Egypt.

The Spider recorded P. Z. S. *l. c.* is, I think, of the same species as the one here noticed. At the time of drawing up the list of Palestine Spiders I had some doubts on this point; but at present I consider them to be identical with each other, as well as with *F. attalica*, Koch, and *F. testacea*, Latr. *F. bicolora*, Walck., is also probably identical with these.

The calamistrum on the metatarsi of the fourth pair of legs differs from that of other Spiders possessing it, both in extent and position. In the present species it consists of a few strong curved spine-like bristles in a longitudinal series, situated on a sharpish ridge, a little depressed, close to the hinder extremity on the inner side of the joint. The inframammillary organ, although present, is not easily seen at first, owing to the numerous and strong hairs with which it is concealed.

Filistata puta, sp. n.

Adult female, length 2½ lines (nearly).

This Spider is very nearly allied to *F. testacea*, Latr., but differs from it in the whole of the fore part (including the legs and palpi) being of a clear straw-yellow colour. The *cephalothorax* has no dark margins; nor is there any dark longitudinal band on the hinder part of the caput, nor on each side of the clypeus, as in *F. testacea*; the legs also are quite immaculate. The colour of the abdomen is a dull yellow, slightly tinged with brown. If the specimen here described be of the normal adult size, it is also a much smaller species than *F. testacea*. The eyes of the hind central pair are smaller in proportion to the hind laterals than in that species; otherwise their position and relative size are very nearly similar.

An adult and immature females were found in interstices of walls at Alexandria in April 1864.

Gen. Œcobius, Luc.

Œcobius putus, sp. n. (Plate LVIII. fig. 1.)

Adult male, length 1¾ line.

In colours and general appearance this Spider is very similar to *Œ. templi*; but it is larger, and the legs have on the metatarsi and tarsi (of the fourth pair at least) several distinct and tolerably strong prominent spines. The eyes are not so large. The interval between those of the central pair (which are the largest of the eight) is equal to an eye's diameter; and the two posterior flattened angular eyes are much smaller. The armature also of all the femora is of a much more spinous character. The abdomen is more thickly covered with white cretaceous spots; and the cruciform marking on the upper side is better defined, though of a similar character. The palpi are thickly furnished with fine pale hairs; the digital joints are much larger than those of *Œ. templi*, and the palpal organs more prominent and developed. Their structure, although on the same general plan, is distinctly different in the development of their processes. From *Œ. domesticus* it may also be distinguished by its larger size and the structure of the palpal organs, as well as by the other marks noted above.

An adult and three immature males, as well as two immature females, were found under small sheets of web on the walls of one of the temples of Upper Egypt, between Denderah and Assouan; but having lost the notes made at the time, I cannot be certain as to the exact locality.

The females had all the leg-armature, including the calamistrum, rubbed off against other specimens in the bottle of spirits in which they came home; but the inframammillary organ is plainly visible both in the females and males.

Two adult males and ten females were found among the ruins of the Temple of Philæ, in Upper Egypt, where they were concealed under small sheets of web spun in the angles and superficial inequalities of the columns and walls.

Œcobius templi, sp. n. (Plate LVIII. fig. 2.)

Adult male, length $1\frac{1}{4}$ line.

This plainly coloured Spider is nearly allied to *Œcobius domesticus*, Lucas, from which it may be distinguished by the much smaller size of the digital joint of the palpus and palpal organs and the different structure of the latter; the eyes also are larger in proportion and more closely grouped together.

The general form and appearance of this species is similar to that of all the other known species. The *cephalothorax* is pale yellow, thinly clothed with hairs, a fine irregular blackish line runs back from each of the two hindermost eyes; and the two lines converge into a single one at the thoracic junction; the impression by which this junction is marked is large and roundish.

The *eyes* are in the ordinary position, and may be either described as in two lateral, longitudinal, curved rows of three each, between which, towards the fore side of the area thus enclosed, are two others (central ones) in a transverse line; or else they may be described as in the usual position of two transverse curved rows of four each; perhaps it will be most convenient to speak of them, in regard to their relative size and situation, as in the former position: the two central eyes are largest of the eight and are separated from each other by less than a diameter's interval, each being near but not contiguous to the foremost eye of the lateral row, on its side; the posterior eye of each lateral row is flattened, obliquely placed, and of an elongated curviangular form (the base of the triangle being in front), and each is contiguous to the next eye of the same row; the interval between the angles of the two posterior eyes nearest to each other is about equal to the base of each of these eyes.

The *legs* are rather long and slender, of a tapering form and pale yellow colour, but not greatly differing in length, their relative length appearing to be 4, 3, 2, 1, ? and they are sparingly furnished with hairs of varied length, but no spines properly so called.

The *palpi* are not very long, but strong, and similar in colour to the legs, the palpal organs giving a yellow brown hue to the digital joint; the radial as well as cubital joints are short, and devoid of projections or apophyses; the digital joint is large, though less than that of *Œ. domesticus*, Luc.; the palpal organs are prominent and have some strong processes directed backwards and inwards: these processes although of a different form and less developed than those of other species, require a good magnified drawing to show their differences; no description could do this.

The *falces* are rather short, slender, and vertical; their colour is similar to that of the cephalothorax.

The *maxillæ*, *labium*, and *sternum* are of normal form and character; and their colour is similar to that of the legs.

The *abdomen* is oval and (looked at in profile) higher at its anterior than at its posterior extremity; it is rather depressed, and projects considerably over the base of the cephalothorax; its colour is a dull testaceous yellow covered with irregular cretaceous white spots, leaving, however, near the fore half of the upperside, a tolerably well-defined longitudinal central cruciform dull brownish marking; the shaft of the cross tapers to a point posteriorly, near which, generally, an oblique line goes off on either side; the spinners are normal; in front of the usual six is an inframammillary organ similar to that of other spiders whose females, like the present, have a calamistrum on the metatarsi of the fourth pair of legs; the anus has the same curious fringe as other species of this and the allied genus (*Uroctea*, Duf.).

The female resembles the male in general characters, but is rather larger, and often has two or more indistinct brownish spots on the hinder part of the abdomen; as above mentioned, the metatarsi of the fourth pair of legs has a calamistrum, or series of curved bristles, concluded to be intended for carding the silk emitted from the inframammillary organs. Mons. Eugène Simon (Les Arachnides de France, ii. p. 6) doubts the existence of these organs, and of the calamistrum, in this genus, or at least significantly remarks that he has been unable to discover them in any species he has examined. I do not, however, feel the smallest doubt that these characters will be found in all the species—*both* in the females, *one* (inframammillary organ) at least in the males. The hairs on the legs of these Spiders (together with those of the calamistrum), appear to be more easily rubbed off than in most other Spiders; and hence several females of this species have no hairs or bristles on the legs at all. Possibly M. Simon has only met with examples whose legs have accidentally been denuded of their armature. Undoubtedly a female of *Œcobius domesticus*, Luc., sent me from Tangier by M. Simon himself, has a calamistrum well marked on one of the posterior legs, but no trace of any on the other. The bristles forming this organ are proportionally longer and slenderer than in many other spiders similarly armed. The inframammillary organ, although narrow and, like that of other spiders, only just elevated above the surrounding surface, is yet, I think, unmistakable in both sexes of all the species known to me (ten in number). M. Simon thinks that I have mistaken a mere transverse fold of the skin for it; if he will, however, examine this fold under a strong magnifier, I think its mammillary nature will be sufficiently evident.

ŒCOBIUS ANNULIPES.

Œcobius annulipes, Lucas, Explor. en Algérie, vol. iv. p. 102, pl. ii. fig. 2.

A single adult female of this Spider was found under a stone in Upper Egypt.

Gen. UROCTEA, Duf.

UROCTEA LIMBATA.

Clotho limbata, C. Koch, Die Arachn.

An adult male and several females were found under stones at Alexandria in April 1864.

M. Simon (Les Arachnides de France, ii. p. 5) states that *U. durandi*, Walck., is also found in Egypt; I did not, however, meet with it myself there, though I found it shortly afterwards in the crevices of old olive-trees at Corfu, whence it could only be extracted by inserting a piece of stick, jagged at the end, into the crevice, and twisting it into the strong silken nest, when the whole with its occupant could now and then be drawn safely out.

Gen. ARIADNE, Sav.

ARIADNE INSIDIATRIX.

Ariadne insidiatrix, Savigny, Egypte, p. 109, pl. i. fig. 3.

An adult female among débris of an old mud wall near Cairo, in January 1864.

Gen. DYSDERA, Latr.

DYSDERA LATA.

Dysdera lata, Reuss-Wider. Mus. Senckenb. tom. i. p. 201.

Several examples which, after careful examination, I believe to be of this species, were found under stones at Alexandria in April 1864. None of these examples were adult; this determination, therefore, cannot be considered absolutely certain, since there are several nearly allied species, such as *D. crocota*, C. Koch, and *D. maurusia*, Thor., of which the immature examples appear almost to defy certain determination.

Gen. OONOPS, Templeton.

OONOPS SCUTATUS, sp. n. (Plate LVIII. fig. 2 A.)

Adult male, length 1¼ line.

This Spider is very closely allied to *Oonops loricatus*, Sim.; it is, however, larger, the measurement of that species (taken from two examples kindly sent to me by M. Simon) not exceeding three fourths of a line in length; the abdomen of the present spider is also of a rather narrower form, but more convex above, and far more glossy and polished on its upper surface, while in colours and some other characters there is but little apparent difference.

The *cephalothorax* is oval, strongly constricted laterally at the caput; the thoracic junctional point is (looked at in profile) of an angular form, and elevated above the level of the rest of the cephalothorax, the hinder slope being abrupt; it is of a bright orange-brown colour; and the sides and hinder part are thickly covered with minute tubercles or granulosities, which in some positions assume the appearance of punctures.

The *eyes* are large, six in number, closely grouped together, and occupy nearly the whole of the upperside of the fore extremity of the caput, where they form a quadrilateral figure whose foremost side is considerably shorter than the hinder one; they do not differ much in size, and are all of a more or less oval shape; those of the hind central pair are closely contiguous to each other, their sides of contact being flattened and so closely joined as almost to conceal the junction. The eyes of each lateral pair are very near together, but not quite contiguous to each other, each fore lateral eye being also equally close to the hind central eye on its side, and each hind lateral eye still closer (almost contiguous) to the hind central nearest to it; the interval between those of the front row (or the fore laterals) is about equal to their longest diameter; the height of the clypeus, which projects a little at its lower margin, is rather less than half that of the facial space.

The *legs* are moderately long and strong, of a lightish orange-yellow colour; and their relative length appeared to be 4, 1, 2, 3; the femora are the strongest, especially at their posterior extremities, which are abruptly enlarged on the upperside close to the articulation, but run evenly thence to the anterior extremities; they are furnished, but not very thickly, with hairs; the tibiæ and metatarsi of the first and second pairs are armed beneath with a double series of long and strong sessile spines; the other two pairs of legs have bristles (or very slender spines) in a similar situation; each tarsus terminates with two curved claws springing from a distinct supernumerary claw- (or heel) joint.

The *palpi* are short and not very strong; their colour is yellow, paler than that of the legs; and they are furnished with hairs and bristles; the cubital and radial joints are short, the former is bent downwards, the latter is rather the longest and strongest; the digital joint is narrow, tapering from the middle to the fore extremity, and no broader than, but almost double as long as, the radial; the palpal organs consist of a very large and prominent oval yellowish lobe with a largish curved, pale brownish yellow, pointed process at its anterior extremity.

The *falces* are moderately long, but not very strong, directed backwards towards the labium, furnished in front with bristly hairs, and similar in colour to the cephalothorax.

The *maxillæ* and *labium* are of normal form, the latter being rather large; these parts, with the *sternum*, are similar to the legs in colour.

The *abdomen* is of an oval form, moderately convex above, and covered both above and below (like *O. punctatus* Cambr., and *O. loricatus*, Sim.) with a bright reddish yellow-brown somewhat corneous scutum, the approximate edges, according as they are more or less separated, showing a greater or less interval of pale yellowish membranous integument. It appears, from observations made by M. Simon, "Aranéides nouv. ou peu connus du midi de l'Europe," Mém. Liége, 2^{e} sér. t. v. p. (sep. cop.) 45, that the Spider he describes has the power to bring the edges of this supra-abdominal and subabdominal scutum together, or to separate them, at will; the spiracular plates are continuous with each other, and, extending forwards, cover the pedicle by which the abdomen is connected with the cephalothorax; this pedicle is longer and more distinctly developed than in most other Spiders; the upper scutum is very highly polished and glossy, and it is thinly but evenly covered with minute tubercles, each of which supports a fine bristly hair; the spinners are short and inconspicuous; they are enclosed below by a narrow reddish yellow-brown semicircular band of a similar nature to the scutum with which the abdomen is covered. When the edges of the upper and lower scutum are brought together, they enclose and conceal the spinners. The spiracular openings are four in number, the two extra ones being smaller than the others and situated one close behind each of the two ordinary openings; M. Simon, *l. c.* pp. 41, 42, says that he has been unable to discover these extra openings in any species of *Oonops* that has come before him; they are, however, plainly visible in the two examples of *O. loricatus* which I received from him, though less plainly in *O. punctatus* Cambr. In the type of the genus, *O. pulcher*, Templ., owing to the minuteness of the Spider, and (after it has been some time in spirit of wine) pale colour of the abdomen, the hinder spiracular openings are very difficult to be seen; indeed in some examples I am quite unable to detect them; in one or two, however, I can discern them sufficiently to be quite convinced that the species possesses them; only, being the merest possible slits, they cannot in general be seen with an ordinary lens. It would be strange indeed if they were really wanting in *O. pulcher*, while so unmistakably present in *O. scutatus*, and *O. loricatus*, as well as in the species next described (*O. pauper*), which last is very nearly allied to *O. pulcher*, and in another undescribed species allied to *O. scutatus*, received from Ceylon; all these Spiders are, as it appears to me, generically quite identical.

Three examples of *O. scutatus* (one male and two females) were found by myself under stones near Alexandria in April 1864.

OONOPS PAUPER, n. sp.

Adult female, length $1\frac{1}{3}$ line.

The cephalothorax, falces, maxillæ, labium, and sternum of this Spider are of a dull orange-yellow colour, the legs and palpi being pale straw-yellow, and the abdomen dull whity brown.

The *cephalothorax* is short, broad behind, and strongly constricted laterally at the caput; the normal indentations are tolerably strongly marked; and the height of the clypeus is equal to half that of the facial space; the highest point (looked at sideways) is at the thoracic junction, whence it runs by an evenly curved slope to the clypeus, the hinder slope not being very abrupt; the clypeus is furnished with some minute tubercles, each of which was probably furnished with a bristly hair; but if so, these had been rubbed off before this description was made.

The *eyes* are large, seated on black tubercular spots, and occupy the whole width of the fore part of the caput; their position is the same as that of those of *O. pulcher* (Templ.), but they are far more circular in shape; the hind lateral and central eyes form a slightly curved row, whose convexity is directed forwards; those of the central pair are as nearly as possible contiguous to each other; and each is separated by rather less than its diameter's distance from the hind lateral nearest to it; the hind laterals have a strong sideway and backward direction, and each is very near, but not quite contiguous to its fore lateral eye; the interval between the fore laterals is equal to very nearly two diameters; those of each lateral pair are placed obliquely, and are rather smaller than those of the central pair.

The *legs* are rather long and slender, except the femoral joints; their relative length appears to be 4, 1, 2, 3. Whatever their armature may have been, it was entirely rubbed off before this description was prepared.

The *palpi* are rather long, slender, and similar in colour to the legs; the digital joint is cylindrical and exceeds in length the radial and cubital joints together.

The *falces* are long, tolerably strong and straight, but strongly directed backwards to the labium; and their front surface is thinly covered with minute, and probably pilose, reddish brown tubercles.

The *maxillæ* and *labium* are forced backwards into a direction perpendicular to the sternum, owing to the strong backward direction of the falces. Their form is thus very difficult to be ascertained, but it appears to be similar to that of the other species of this genus.

The *abdomen* is short, oval in form, considerably convex above, and does not project over the base of the cephalothorax; the connecting pedicle being distinct. Four spiracular springs are plainly visible, the two extra ones being placed not far behind the ordinary pair. The spinners are short; those of the inferior are much the strongest. A single example was found under a stone at Alexandria in April 1864.

Fam. DRASSIDES.

Gen. GNAPHOSA, Latr.

GNAPHOSA PLUMALIS.

Gnaphosa plumalis, Cambr. Proc. Zool. Soc. 1872, p. 225, pl. xv. fig. 3.

An adult male of this Spider was found under a stone at Alexandria.

GNAPHOSA CONSPERSA.

Gnaphosa conspersa, Cambr. Proc. Zool. Soc. 1872, p. 230. pl. xv. fig. 5.

An adult male and female, besides immature examples of both sexes, were found under stones near the pyramid of Ghizeh.

GNAPHOSA PROCERA.

Gnaphosa procera, Cambr. Proc. Zool. Soc. 1874, p. 373, pl. i. fig. 2.

This Spider is very similar in size, general form, structure, colours and markings to *G. conspersa,* but may be readily distinguished by the special form and structure of the palpi and palpal organs; examples of both sexes in the adult state were found under stones near Alexandria.

GNAPHOSA MARGINATA.

Gnaphosa marginata, Cambr. Proc. Zool. Soc. 1874, p. 374, pl. li. fig. 3.

A single adult female was found among the ruins of an old wall near Cairo.

GNAPHOSA VENATRIX.

Gnaphosa venatrix, Cambr. Proc. Zool. Soc. 1874, p. 375, pl. li. fig. 4.

A single adult male of this Spider, which is nearly allied to *G. plumalis*, Cambr., was found at Alexandria. The form of the radial joints of the palpi will serve to distinguish it at once from its near allies.

Gen. DRASSUS, Walck.

DRASSUS MUNDULUS.

Drassus mundulus, Cambr. Proc. Zool. Soc. 1872, p. 324, pl. xv. fig. 11.

An adult male and female were found among the ruins of an old wall at Cairo.

DRASSUS SENILIS.

Drassus senilis, Cambr. Proc. Zool. Soc. 1872, p. 236, pl. xv. fig. 13.

An adult female was found under a stone near Alexandria.

DRASSUS INFUMATUS.

Drassus infumatus, Cambr. Proc. Zool. Soc. 1872, p. 238, pl. xv: fig. 16.

An adult example of each sex was found under the ruins of an old mud wall near Cairo.

DRASSUS ORNATUS.

Drassus ornatus, Cambr. Proc. Zool. Soc. 1874, p. 388.

A single example of the female was found under a piece of stone, near Alexandria.

DRASSUS CAMPESTRATUS.

Drassus campestratus, Cambr. Proc. Zool. Soc. 1874, p. 392, pl. li. fig. 17.

An adult male was found under a stone near Alexandria.

DRASSUS ALEXANDRINUS.

Drassus alexandrinus, Cambr. Proc. Zool. Soc. 1874, p. 393, pl. li. fig. 18.

A single adult male was found among the débris of an old wall near Alexandria.

DRASSUS ÆGYPTIUS.

Drassus ægyptius, Cambr. Proc. Zool. Soc. 1874, p. 394, pl. li. fig. 19.

An adult male and female were found under stones at Alexandria.

DRASSUS VULPINUS.

Drassus vulpinus, Cambr. Proc. Zool. Soc. 1874, p. 397, pl. li. fig. 22.

A single adult female was found in an old building at Cairo.

DRASSUS DENOTATUS.

Drassus denotatus, Cambr. Proc. Zool. Soc. 1874, p. 398, pl. li. fig. 24.

A single adult female at Cairo.

DRASSUS PUGNAX.

Drassus pugnax, Cambr. Proc. Zool. Soc. 1874, p. 399, pl. li. fig. 25.

An adult male was found among the débris of an old wall at Cairo.

Gen. PROSTHESIMA, L. Koch.

PROSTHESIMA LÆTA.

Prosthesima læta, Cambr. Proc. Zool. Soc. 1872, p. 241, pl. xv. fig. 19.

An adult male, together with an immature example of each sex, were found under stones near Cairo.

PROSTHESIMA PICINA.

Prosthesima picina, Cambr. Proc. Zool. Soc. 1872, p. 242, pl. xv. fig. 20.

An adult female under a stone near Alexandria.

PROSTHESIMA TRISTICULA.

Prosthesima tristicula, Cambr. Proc. Zool. Soc. 1874, p. 377, pl. li. fig. 6.

A single adult male was found under a piece of rock near Alexandria.

PROSTHESIMA CURINA.

Prosthesima curina, Cambr. Proc. Zool. Soc. 1874, p. 379.

An adult male, under a stone at Alexandria.

PROSTHESIMA NILICOLA.

Prosthesima nilicola, Cambr. Proc. Zool. Soc. 1874, p. 380, pl. li. fig. 8.

A single example of the adult male was found under a stone near Alexandria.

PROSTHESIMA MOLLIS.

Prosthesima mollis, Cambr. Proc. Zool. Soc. 1874, p. 381, pl. li. fig. 9.

An adult female under a stone near Alexandria.

PROSTHESIMA PALLIDA.

Prosthesima pallida, Cambr. Proc. Zool. Soc. 1874, p. 383, pl. li. fig. 11.

A single example of each sex in the adult state were found under stones near Alexandria.

PROSTHESIMA INAURATA.

Prosthesima inaurata, Cambr. Proc. Zool. Soc. 1872, p. 246, pl. xv. fig. 26.

An adult male and female were found under stones near Alexandria.

Gen. MICARIA, Westr.

MICARIA CINCTA.

Micaria cincta, L. Koch, Die Arachn.-Fam. der Drassid. p. 53, pl. iii. figs. 36, 37.

An adult of each sex under a stone at Alexandria.

Gen. CHEIRACANTHIUM, Koch.

CHEIRACANTHIUM DUBIUM, Cambr. Proc. Zool. Soc. 1874, p. 403, pl. lii. fig. 28.

A single adult male at Alexandria.

CHEIRACANTHIUM EQUESTRE.

Cheiracanthium equestre, Cambr. Proc. Zool. Soc. 1874, p. 404, pl. lii. fig. 29.

An adult example of each sex near Cairo.

CHEIRACANTHIUM ISIACUM.

Cheiracanthium isiacum, Cambr. Proc. Zool. Soc. 1874, p. 407, pl. lii. fig. 31.

Adults of both sexes on low plants in the neighbourhood of Cairo.

CHEIRACANTHIUM TENUISSIMUM.

Cheiracanthium tenuissimum, L. Koch, Die Arachn.-Fam. Drassid. p. 264, pl. x. figs. 161–163.

An adult female at Alexandria.

CHEIRACANTHIUM ANNULIPES.

Cheiracanthium annulipes, Cambr. Spid. of Palest. & Syria, P.Z.S. 1872, p. 254, pl. xvi. fig. 36.

An adult female at Cairo.

Fam. PALPIMANIDES.

Gen. PALPIMANUS, Duf.

PALPIMANUS HÆMATINUS ?

Palpimanus hæmatinus, C. Koch, Die Arachn. iii. p. 21, pl. 80. fig. 179.

A female, which I take to be perhaps of this species, was found in the neighbourhood of Alexandria in 1864; and it appears to be identical with examples found in Palestine in 1865. I have since, however, had occasion to doubt whether these are, or not, the true *P. hæmatinus* of C. Koch; they are certainly different from a closely allied species which I found subsequently in Corfu and at Smyrna. This latter species may be the true *P. hæmatinus*, C. K., coming, as it does, nearly from the same region as the type of Koch's species. The Spiders of this genus are very nearly allied to each other, and are remarkably similar in their general characters and appearance; and it will require a close comparison of their respective genital organs to determine the species with any certainty.

PALPIMANUS SAVIGNYI.

Platyscelum savignyi, Aud. in Sav. Egypte, p. 167, pl. vii. figs. 6, 7.

Two females, certainly distinct from that last noted, were found in ascending the Nile from Cairo to Thebes. My note of the exact locality has been mislaid; but I feel little doubt that these are of the same species as that mentioned in the synonym above quoted.

Fam. ERESIDES.

Gen. ERESUS, Duf.

ERESUS PETAGNÆ.

Eresus petagnæ, Aud. in Sav. Egypte, pl. iv. fig. 11.

Adult and immature females of this species were found under stones near Alexandria. But for M. Simon's opinion ("Note sur la famille des Eresidæ," Ann. Soc. Ent. Fr. 5e sér. tom. iii. 1873, p. 357), I should have considered this species to have been identical with *Eresus imperialis*, Duf. (= *E. frontalis*, Latr.)

ERESUS DUFOURII.

Eresus dufourii, Aud. in Sav. Egypte, p. 151, pl. iv. fig. 7.

Immature examples of this very distinct species were found on low plants on the edge of the desert above Assouan. I have received from Italy adults of both sexes of a species which I believe to be identical with the present. It is a small species, the adult male measuring only 2¾ lines in length, while that of the adult female is no more than 3 lines.

Fam. DICTYNIDES.

Gen. DICTYNA, Sund.

DICTYNA INNOCENS.

Ergatis innocens, Cambr. Spid. Palest. & Syria, P. Z. S. 1872, p. 262.

Adult male, length rather more than 1 line.

Females only of this distinctly marked species were found in Palestine; but a single adult male example of what I feel no doubt is of the same species, found on a low plant near Cairo, enables me now to give the distinctive characters of the latter sex.

In colours and markings both sexes are alike. The *cephalothorax* of the male is of a dark yellowish-brown colour, thinly clothed with coarse hoary hairs; the caput is strongly elevated and well rounded; the clypeus projects considerably forwards, and its height exceeds half that of the facial space.

The *eyes* are in the usual position; those of the fore central pair are nearer together than each is to the fore lateral eye on its side.

The *legs* are moderate in length and strength; their relative length is 1, 2, 4, 3. They are of a dull yellow colour, faintly banded with brown, and clothed with coarse hairs, of which many are of a hoary colour.

The *palpi* are of a dull pale yellow colour; the radial and cubital joints are short, but about equal in length; and from the upperside at the hinder extremity of the former there is a small thorn-like blackish spine directed forwards; the digital joint is large and broad; the palpal organs are simple, and surrounded by a strong black spine, which arises from their base on the inner side, and terminates in a fine point near their base on the outer side.

The *falces* are of moderate size, and of the curved form usual in spiders of this genus, though less remarkably so than in some others, and they are of a dark brown colour.

The *maxillæ*, *labium*, and *sternum* are similar in colour to the falces, and clothed thinly with coarse hoary hairs.

The *abdomen* is oval and projects a little over the base of the cephalothorax; the ground-colour is dull brownish-yellow clothed with hoary and other hairs; the longitudinal central black-brown marking on the fore part of the upperside is cruciform near its hinder extremity, where it is also strongly bifid, the limbs of the bifid portion being recurved; this bifid part represents, in fact, the foremost of the series of blackish-brown angular bars running along the middle of the hinder half; the sides are irregularly marked and blotched with dark brown; and the underside has a broad longitudinal central brown band throughout its length; and on either side of this band is a large oblong oval whitish patch, formed chiefly by hoary hairs. The transverse supernumerary mammillary organ is present, close in front of the ordinary spinners; but no calamistra are visible on the metatarsi of the hinder pair of legs.

DICTYNA CONDUCENS, sp. n. (Plate LVIII. fig. 3.)

Adult male, length 1 line.

This Spider is very nearly allied to the next, *D. condocta*, resembling it closely in colours and in the general character of its markings. It may, however, be easily distinguished by the less distinctness and boldness of the markings on the abdomen, as well as by the darker thorax contrasted against the paler caput, some of the hoary hairs on which last form a tolerably distinct narrow longitudinal band.

The *clypeus* also *exceeds in height* half that of the facial space, and projects more forwards. The underside of the abdomen also is of a uniform pale dull yellowish colour.

The radial joints of the palpi are destitute of the characteristic spine near the hinder extremity of the upperside; the digital joints are smaller in proportion; and the spine surrounding the palpal organs is far less strong and conspicuous, being shorter and much more slender.

The *falces*, while presenting the characteristic form of the genus, exhibit it in a less marked degree than those of *D. condocta*.

Adults of both sexes appeared to be numerous on the branches of the Sont Acacia, in February, March, and April, near Cairo and in other parts of Lower Egypt.

DICTYNA CONDOCTA, sp. n. (Plate LVIII. fig. 4.)

Adult male, length rather less than 1 line.

The *cephalothorax* of this small species is strongly constricted laterally at the junction of the caput and thorax; the caput is slightly elevated and rounded; the clypeus projects forwards at its lower part, and its height is not quite equal to half that of the facial space.

The colour of the cephalothorax is a deep yellow-brown with a blackish margin; and its surface is thinly furnished with coarse hoary hairs.

The *eyes* are in the usual position; those of the fore central pair are separated by a wider interval than that by which each is divided from the lateral eye on its side; those of the fore and hinder central pairs form very nearly a square, the posterior side being a little longer than the anterior one; those of the fore central pair are dark-coloured, the rest being of a light hue.

The *legs* are moderately strong, and rather long; their relative length being 1, 2, 4, 3; they are of a pale yellowish hue, and furnished with hairs.

The *palpi* are short, similar to the legs in colour, except the digital joint, which is of a yellow-brown hue; the cubital and radial joints are both very short; but the latter appears to be a little the longest, and has at the hinder extremity of the upperside a short, bent, pointed spine whose tip is of a dark blackish colour; the digital joint is large, and the palpal organs simple, though prominent at their hinder extremity; they are completely encircled by a strong black tapering spine, which is very visible close beneath the margins of the joint.

The *falces* are of the usual characteristic form, and similar in colour to the cephalothorax.

The *maxillæ, labium,* and *sternum* are rather paler in colour than the cephalothorax, but present nothing at variance with the generic type; the sternum is finely clothed with coarse hoary hairs.

The *abdomen* is oval and projects considerably over the base of the cephalothorax; it is of a yellowish brown colour, clothed with hoary, yellowish, and blackish hairs intermixed; it has a narrow ill-defined dark brown longitudinal central bar on the fore half of the upperside, cruciform at its hinder part, and followed by a series of angular lines or chevrons to the spinners; these lines terminate laterally in indistinct spots or blotches; and outside the two or three hindermost blotches are some ill-defined spots or patches of hoary hairs, of which there are some more in two tufts just above the spinners; the underside is of a dull brownish yellow hue, clothed with greyish hairs and with pale lateral margins.

An adult female, evidently of the same species, is considerably larger, and the abdomen covered with cretaceous white spots; the longitudinal central brown marking on the fore half of the upperside is broader, better-defined, and angular on its lateral margins, and the spots laterally terminating the succeeding angular bars are well defined, forming two longitudinal rows converging to the spinners; the underside has a broadish longitudinal brown band; and the spinners are surrounded by several short blackish radiating elongate spots or short bars. The usual supernumerary mamillary organ is present, together with calamistra on the metatarsi of the fourth pair of legs; the latter, however, do not exist in the males.

Two adult males and two females, one adult, the other immature, were beaten from the branches of the Sont Acacia in lower Egypt in February 1864.

Fam. AGELENIDES.

Gen. TITANŒCA, Thor.

TITANŒCA DISTINCTA.

Amaurobius distinctus, Cambr. P. Z. S. 1872, p. 263.

Titanœca albomaculata, Sim. Arachn. de France, i. p. 218, pl. iii. fig. 7.

Adults and immature examples of this Spider were found among the dead stems and débris of bushes and under stones near Alexandria in April 1864. In the same month of the year following I met with it more abundantly under stones and fragments of rock and among débris on the plains of the Jordan.

The synonymic reference above to M. Eugène Simon's 'Arachnides de France' is, I feel sure, correct; but there seems much reason to doubt the correctness of the reference quoted by that author from M. H. Lucas's 'Exploration en Algérie;' the *Epeira albomaculata*, Luc., seems to me by no means certainly of the same species, or even genus, as that described and figured *l. c.* by M. Simon.

Gen. AGELENA.

AGELENA LEPIDA, sp. n.

Adult male, length 3 lines; adult female, $3\frac{1}{2}$ lines.

The whole of the fore part of this Spider is yellow. The *cephalothorax* has its surface clothed with a grey pubescence; it is marked with somewhat irregular blackish-brown radiating lines following the direction of the normal grooves and indentations, and bounded laterally by another broken or interrupted line of the same colour a little way from, and parallel to, the lateral margins, giving the surface of the *cephalothorax* a somewhat boldly reticulate appearance.

The *eyes* are in the ordinary position, forming two strongly curved and nearly parallel lines, whose convexity is directed backwards. The interval between those of the hind central pair is a little greater than that between each and the lateral eye of the same row on its side; those of the fore central pair are the largest of the eight, they are separated by less than a diameter's interval, and each is very nearly contiguous to the lateral of the same row on its side. The four central eyes form a quadrangular figure whose longitudinal is rather greater than its transverse diameter.

The *legs* are long and tolerably strong, their relative length apparently 4, 1, 2, 3; the difference, however, between those of the second and third pairs is very slight. The femora are thickly and irregularly banded with blackish brown, they are furnished with hairs and long spines; and each tarsus ends with three slightly curved claws, of which the superior pair are pectinated, and the inferior one is much the smallest.

The *palpi* are short and strong; the radial and cubital joints are very short; the latter is the longest, and has a short, moderately strong, bifidly angular prominence at the extremity of its outer side; it has also two long, strong curved tapering bristles directed forwards from its upperside, one from the fore, and the other from the hinder extremity; the radial joint is also somewhat protuberant in front towards the outer side, and is furnished with two pairs of bristles, of the same kind as those on the cubital joint; the digital joint is large equalling the falces in length, and its fore extremity is drawn out into a longish point. The palpal organs are well developed, surrounded on their outer margin with a strong shining corneous-looking yellow-brown fillet, and terminating anteriorly with a strong twisted corneous process of a similar colour.

The *falces* are rather long, strong, straight, prominent in front near their base, and directed rather backwards towards the labium.

The *maxillæ* and *labium* are of normal form, the latter being a little suffused with a dusky blackish hue.

The *sternum* has a strong irregularly edged blackish margin.

The *abdomen* is of a dull yellowish colour, with a broad longitudinal whitish band on its upperside; this band is mottled, and at the fore part strongly suffused with rusty red; its lateral edges are crenellated or bluntly denticulate, the prominent points being distinctly whiter and brighter than the rest, and forming two nearly parallel longitudinal rows of bold whitish spots along the whole length of the abdomen; most of these spots are in fact the enlarged extremities of the usual transverse angular bars or chevrons; and between each the space is black; there are also some black spots and markings on the sides, the underparts of the abdomen being unicolorous; the central longitudinal band has some black spots and markings on its fore part irregularly defining the normal elongate marking; the spinners are yellow, devoid of markings, and those of the superior pair are rather more than double the length of those of the inferior, the second (terminal) joint being smaller, though longer, than the basal one.

The female resembles the male in colour and markings; these are, however, less strong and distinct than in the latter sex, while the legs of the female have the tibiæ as well as the femora annulated with dusky blackish, and the underside of the abdomen has two longitudinal lateral lines of the same hue. The genital aperture presents two oval orifices side by side.

An adult male and several adult and immature females were found in tufts of coarse grass and dry herbage on the desert near Gebel y Silsilis, Upper Egypt, in March 1864.

Gen. TEGENARIA.

TEGENARIA PROXIMA.

Tegenaria proxima, Cambr. P. Z. S. 1873, p. 217.

An adult male of this Spider, which, though exceedingly closely allied to *T. derhamii* (Scop.), is yet quite distinct, was found in Cairo in January 1864.

Gen. TEXTRIX, Sund.

TEXTRIX COARCTATA.

Aranea coarctata, L. Duf., Sim. Arachn. de France, ii. p. 125.

Textrix moggridgii, Cambr. Journ. Linn. Soc. xi. p. 537, pl. xiv. fig. 6.

Adult and immature females of a Spider which I believe to be of this species were found among stones and débris at Alexandria in April 1864; the adult examples, however, are more brightly coloured than those I have received from Mentone; the cephalothorax and legs being of an orange-yellow brown colour; the fore part of the former (caput) and the falces are tinged strongly with red-brown, and the median line of the fore part on the upperside of the abdomen suffused with rusty red. These differences of colouring are probably dependent on the length of time that had elapsed since the Spider effected the final casting-off of its skin.

Gen. ENYO.

ENYO NITIDA.

Enyo nitida, Aud. in Sav. Egypte, p. 135, pl. iii. fig. 7.

Clotho nitida, Walck. Ins. Apt. i. 639.

An adult female of an *Enyo* which I believe to be of this species was found under a stone near Alexandria. It may, however, possibly be of a different species, though it agrees in most respects with the descriptions given (*ll.c.*). The chief difference I can detect is in the colour of the legs; but as this may differ considerably in examples of different ages or in different states of preservation, it is not always conclusive on a point of specific identity. In the example now recorded the legs are yellow, the greater part of the femora of the first pair as well as lower part of those of the other pairs being suffused strongly with brownish black; the cephalothorax is deep reddish brown, becoming black on the caput; the sternum and labium are yellowish strongly suffused with deep brown, the maxillæ and palpi being dull yellowish; and the abdomen is of a uniform purplish black above and on the sides, the underside being of a dull yellowish drab colour; the legs are furnished with short dark blackish brown hairs.

In the description given of *E. nitida* by Walckenaer the legs are said to be black, with a white ring at their base, and another of greater extent at the base of the femora of the third and fourth pairs.

ENYO EXPERS, sp. n.

Female, immature, length 1 line.

The whole of the fore part of this Spider is of a brightish yellow colour, the legs, palpi, and sternum being rather the palest.

The *cephalothorax* is of a somewhat oblong oval form with little or no lateral constriction at the caput; its convexity also is very moderate; the clypeus, which equals in height half that of the facial space, is very projecting.

The *eyes* are in the ordinary general position: the two large fore central ones are on a large roundish black patch; and the three lateral ones on either side are contiguous to each other and form a short curved row on either side, the foremost eye being very nearly contiguous to the large eye on its side; the interval between the fore central eyes is nearly an eye's diameter.

The *legs* are not very long; their relative proportion appears to be 4, 1, 2, 3; and they are furnished with hairs only.

Falces not very long, but strong, conical, and vertical.

Abdomen oblong-oval; of a dull yellow colour, the upper part dark rusty red, with several indistinct slightly angular pale bars or chevrons on the hinder half. The spinners (apparently four in number) are not easily discernible; but on either side of them is a patch of deep rusty brown.

A single example of this Spider (differing both in its general form and colour from all others known to me) was found under a stone at Alexandria in the month of April 1864.

Fam. HERSILIIDES.

Gen. HERSILIA, Sav.

HERSILIA CAUDATA? var. (aut nov. sp.). (Plate LVIII. fig. 6.)

Hersilia caudata, Sav. Egypte, p. 114, pl. i. fig. 8.

In respect to this Spider, the type of the genus, all authors subsequent to Savigny appear merely to have followed him in his figure and description. The locality given for *H. caudata* is "les environs du Caire." On the first morning of my arrival at Cairo, in January 1864, I found a species of *Hersilia* frequent on the trunks of the trees in the Esbekeyah, close in front of Zeck's hotel; all were females, in different stages of immaturity. Numerous searches there and in other parts round Cairo failed to produce more than this one species, which I met with again several times during the ascent of the Nile to Assouan. I did not find any other species (except one, of a now separated genus *Hersilidia*, under stones at Alexandria) during my stay in Egypt. I cannot, therefore, help thinking that, in spite of very manifest differences between my specimens and the figure and description of *Hersilia caudata* given by Walckenaer and Lucas (following Savigny), the species I now record is that upon which the latter author founded the genus.

The following description of the examples I met with may perhaps call the attention of araneologists to the differences noted; and possibly the true *H. caudata* may eventually prove to be a distinct species, in which case I would propose for that now described the name *Hersilia diversa*.

The length of the largest immature female captured is rather over 3½ lines. The colour of the cephalothorax is a deep blackish brown, rather the palest along the middle line, on the hinder slope, and a little above the lateral margins; the upper part of the caput is black, with a short brightish orange-yellow longitudinal streak on the hinder part between the eyes of the hind central pair. The clypeus (which equals in height two thirds of that of the facial space) is orange-yellow above and dull yellow on its lower part, the middle of which has a short longitudinal white streak with a blackish patch on each side of it. This arrangement of colours gives a very distinct and diversified appearance to the "facies," and appears to be pretty well defined in all the examples met with (*vide* fig. 6 *b*).

The *legs* are of a dull yellowish hue, marked and broadly annulated with yellow and blackish-brown; these markings form a broken longitudinal line of deepish black-brown on the fore sides of the femoral joints.

The *palpi* are similar to the legs in colour, and marked with black-brown on their upper or fore sides.

The *abdomen* is of a dull yellowish brown above, thickly punctuated with pale yellowish points mixed with a few blackish spots here and there, chiefly near the cephalothorax, the lateral margins of the upperside of the abdomen are very distinctly defined by the inner edge of the black markings on the sides; this well-defined edge is denticulate or strongly crenellated; along the middle line of the fore half is a strong and very distinct black longitudinal marking, denticulate or irregularly jagged on its edges; this marking is broadest near its middle, and comes to a blunt point about two thirds of the distance from the cephalothorax to the spinners, and is followed by some broken angular bars, or chevrons, which decrease in length towards the hinder extremity of the abdomen; in addition to the above markings, there are four pale transverse wavy lines, which cross the whole of the upperside of the abdomen, the two foremost, however, being interrupted by the longitudinal black marking; the sides of the abdomen are marked, but not regularly, with blackish brown spots and small markings, some of them assuming an oblique direction; but none of the lateral markings extend far down towards the underside, which is (as are also the sternum, maxillæ, and labium) of a plain yellowish hue devoid of markings. The long spinners of the superior pair are dull yellow faintly marked or annulated with yellowish brown, or sometimes with brownish black.

The description given by Walckenaer and Lucas from Savigny (I am unfortunately unable to give it from Savigny's work itself) is:—"Roux; le corselet marqué de deux bandes dorsales brunes, et bordé de taches de la même couleur. Abdomen varié sur le milieu de deux rangées contiguës de taches cannelées brunes, et sur les côtés, de traits bruns obliques."

The quickness of the movements of this spider, which, until disturbed, lies motionless, with its legs flat and extended in all directions over and round the trunks of the trees, is astonishing, and renderėd its capture, at first, very difficult; after a little practice, however, I obtained it more easily by dexterously flicking it off the tree with a twig into an entomological net held underneath.

This was the first Spider that I had seen in Egypt; and it was thus invested with a peculiar interest, being also so unlike any thing European that I had before met with.

Neither sex appears as yet to have been found in the adult state; and in fact I saw, and captured, only females, and all those immature. Walckenaer does not state whether the example (also a female) described by Savigny was adult or immature.

It does not appear to have been before noted that the subdivision of the metatarsi (on which the separation of *Hersilia* from *Hersilidia* is chiefly based) only occurs in respect to the legs of the first, second, and fourth pairs, the short third pair having the usual number of joints, with an undivided metatarsus. It is singular that M. Lucas, who has gone so minutely into the structure of the legs of *Hersilia*, should not have noticed this point.

Gen. HERSILIDIA, Sim.

HERSILIDIA LUCASII, sp. n. (Plate LVIII. fig. 5.)

Adult male, length $2\frac{1}{2}$ lines.

The whole of the fore part of this Spider, whose general form closely resembles other species of the genus, is of a pale yellow colour, the cephalothorax, palpi, and legs being covered with a fine grey pubescence; the *cephalothorax* has a dusky brown margin; and an indistinct line of the same hue runs backwards from each eye of the hind central pair, meeting and terminating at the normal indentation which marks the union of the caput and thorax; the hinder slope has also a central longitudinal brown line.

The *eyes* are in the usual position; the four central ones form a square whose fore side is a little longer than the hinder side, the two eyes forming the fore side being the largest of the eight, and separated from each other by an interval of rather more than an eye's diameter.

The *legs* are strong, but of more moderate length as compared with those of *Hersilia*, and the metatarsi are undivided; their relative length appears to be 4, 2, 1, 3, those of the first and second pairs are unicolorous, while the femora and, in some examples, the tibiæ of those of the third and fourth pairs are faintly annulated with dusky brown; they are furnished with hairs and a few short fine spines.

The *palpi* are strong and moderately long; the radial and cubital joints are short, about equal in length, and of a somewhat tumid or nodiform appearance; the humeral joint has a few black spines dispersed on its upperside, and there are a few bristles on the other joints; the digital joint is drawn out at the fore extremity into a longish point (like that of the genus *Tegenaria*) and terminates with two black, slightly curved claws, in this point resembling *Hersilidia simonii*, Cambr. (found in the Jordan valley and at Jerusalem). The palpal organs are of a somewhat flattened circular form, encircled with a dark corneous margin or closely fitting spine, and have two small erect corneous processes near together, about the middle of their fore part, one of these processes being shorter and more obtuse but stronger than the other.

The *falces, maxillæ,* and *labium* are of normal form; and the *sternum* has a broadish dusky-brown lateral margin.

The *abdomen* is of an oblong-oval form, a little broadest towards its hinder part, rather truncate before, and projecting a little over the base of the cephalothorax; it is of a straw-yellow colour, clothed with a fine grey pubescence; on the upperside a well-defined longitudinal black-brown marking occupies the middle line; this marking begins near the fore margin and extends halfway to the spinners, and is very strongly angulated on its edges, the middle part being the strongest, and taken by itself forming a large diamond-shaped patch; the sides are marked with three or four oblique lines of small elongated brown spots reaching quite to the underside, which is of a plain dull luteous colour; the spinners are short compared with those of *Hersilia*, but similar in position and character, and resembling the legs in colour.

The female (immature) resembles the male in colours and markings.

This species is nearly allied to *Hersilidia simonii*, Cambr.; but, besides being larger, it differs both from that species and from *H. oraniensis*, Luc., in being of a different hue and much less strongly marked, especially in the annulation of the legs; the pattern also on the abdomen differs notably from that of *H. simonii*; and there are on the abdomen none of the coarse hairs with which that of *H. simonii* is furnished. Two adult males and several immature examples of both sexes were found under stones in the desert between Alexandria and Ramleh. Their position is usually with the legs extended flat upon the underside of the stone, with the sandy-yellow mottled colour of which the colour of the Spider so admirably agrees that it requires a practised eye to detect it; and in fact its movement is generally the first cause of its detection. Its specific name is conferred in compliment to M. H. Lucas, of the Jardin des Plantes, Paris, to whom we are indebted for descriptions and figures of so many North-African Spiders.

Fam. SCYTODIDES.

Gen. LOXOSCELIS, Heinek. et Lowe.

LOXOSCELIS RUFESCENS.

Loxoscelis rufescens, Duf. An. Sc. Phys. t. v. p. 203, pl. 76.
Scytodes rufescens, Sav. Egypte, pl. v. fig. 2.

Adult and immature females of this Spider were found among the ruins of an old mud wall near Cairo, and an immature male in a similar situation at Alexandria.

Gen. SCYTODES.

SCYTODES THORACICA.

Scytodes thoracica, Walck. Ins. Apt. i. p. 271.

An immature female of a Spider which is probably only a variety of this species, was found in an old building at Cairo. The only apparent difference between this example and the typical *S. thoracica* consists in the very faintly marked cephalothorax, the abdomen marked only with two converging rows of black spots on the hinder half, and the legs wholly immaculate. The discovery, however, of adult examples may possibly prove it to be of a distinct though closely allied species; at present it would scarcely be justifiable to found a new species upon a single immature example.

Dr. L. Koch (Ægyptische und Abyssinische Arachniden, Nürnberg, 1875, p. 27, Taf. iii. fig. 2) describes and figures a new species from Cairo (*S. immaculata*); from this, however, the present Spider differs quite as much as from the typical *thoracica*, though possibly it may eventually prove to be a variety of Koch's Spider instead of *S. thoracica*.

SCYTODES KOCHII, sp. n.

Female, immature, rather over 1½ line in length.

Although the cephalothorax of this Spider is but little higher at its posterior than at its anterior extremity, it is, I believe, a true *Scytodes*. The clypeus is broad, truncate, and a little upturned at its lower edge, its height being about equal to the dimensions of one of the fore central pair of eyes; the colour of the cephalothorax is a rather bright orange-yellow, with a deep-brown band running backwards from each lateral pair of eyes nearly, if not quite, to the hinder margin; these bands are broadest about the middle, and each is marked with a slightly oblique longitudinal stripe of orange-yellow near the fore extremity; and between them is a deep-brown tapering line running a little way backwards from the central pair of eyes. The cephalothorax is also strongly margined with dark brown; and each of its sides is marked with three short, but distinct, oblique brown bars or stripes joining in at their lower extremity with the lateral brown margins. The surface of the cephalothorax is closely covered with erect bristly hairs.

The *eyes* are in three pairs, in the usual position; the two fore lateral eyes are the largest, and those of the central pair appear to be the smallest, though not much, if any thing, smaller than the hind laterals.

The *legs* are yellow; the tibiæ of the fourth pair are broadly and distinctly banded with brown; those of the third pair are faintly so banded, while those of the first and second pair are dark yellow-brown with a narrow indistinct band of yellow, the metatarsi also of the first pair being strongly suffused with yellow-brown.

The *palpi* are yellow, annulated with dull brown.

The *falces* yellow, with a considerable part of their foreside yellowish brown.

The *maxillæ, labium,* and *sternum* are yellow.

The *abdomen* is of a deep chocolate-brown above and yellow underneath; the central longitudinal line of the upperside is a little paler, and has two yellow spots on its fore part, and a yellow longitudinal line on its hinder part; the brown and yellow of the upper- and undersides run into each other in a Vandyke pattern, giving the sides a very distinct curvilinearly striped appearance. The abdomen, like the cephalothorax, is covered thinly with strong erect bristly hairs.

A single example of this pretty and very distinct species was found among débris near Cairo in January 1864; and I have very great pleasure in naming it after my kind friend Dr. Ludwig Koch, of Nürnberg.

Fam. PHOLCIDES.

Gen. PHOLCUS, Walck.

PHOLCUS SEMICAUDATUS, sp. n.

Adult male, length 2 lines.

The *cephalothorax* is of the ordinary form and of a pale straw-yellow colour.

The *eyes* are in the usual general position; three large eyes contiguous to each other in a triangle on a tubercle on either side, and a pair of much smaller size and nearly contiguous, just opposite the inner eyes of the other two groups; each eye of this pair is rather less than a diameter's distance from the two foremost eyes of the lateral group nearest to it.

The *legs* are very long, exceedingly slender, and furnished with fine hairs; their colour is similar to that of the cephalothorax, the genual joints are yellow-brown; and the femora and tibiæ, especially the former, are distinctly marked with small linear black dots and spots.

The *falces* are suffused with yellow-brown, strongly excavated in front, their fore margin on the outer side terminating in a corneous point, and of a red-brown colour.

The *palpi* are large, similar in colour to the legs, strong and tumid, especially the radial joint, which is of a somewhat globular form. The digital joint is considerably produced at its fore extremity (the produced portion being dark yellowish brown), and terminating with an irregular corneous process. The palpal organs are globular, with a strong corneous process issuing from them and directed backwards; this process is of a dark red-brown colour mixed with black, of a somewhat twisted form, and very obtuse at its extremity.

The *maxillæ* are of the usual form, pale yellow at their base and dark brown at their fore part, the extreme point being whitish.

The *labium* is also dark brown, but pale whitish at its apex.

The *sternum* is dark brown, marked obscurely with some still darker radiating lines.

The *abdomen* is of moderate length, very convex above, gradually and considerably elevated backwards and, in a slightly produced form, at its hinder extremity, giving it a subtriangular shape when looked at in profile; this elevation is much stronger in the female than in the male; it is of a dull luteous colour; the fore half of the upperside has an indistinct elongate central longitudinal marking, sometimes pretty distinctly defined by a fine blackish marginal line; this marking is broadest in the middle, where it has an angular point and short oblique line running from it backwards on each side, with a similar point and line on either side of its obtuse termination; following this are two or three duplex angular blackish bars, or chevrons, continued by some fine linear spots and markings towards the spinners; and on either side of the highest point of the abdomen are two or three blackish irregular spots. The different examples vary in the number, extent, and regularity of these markings; in some specimens most of them are obsolete or nearly so. A broad black and red-brown band occupies the central longitudinal line of the underside, but is usually interrupted a little way from the spinners.

The female resembles the male in colours and markings; but her abdomen, as above observed, is more strongly elevated behind, and its markings are generally better-defined; the genital aperture is a large transverse slit in a strongly but gradually elevated epigyne.

The form of the abdomen, which approaches but is not nearly so produced as that of *P. caudatus* (Duf.), will readily distinguish this species.

I met with it pretty frequently among the ruins of the ancient temples in various parts of Egypt above Cairo, but principally in those above Thebes. It is very nearly allied to, but appears to be quite distinct from, *Pholcus lyoni*, Bl., found in the Calcutta Presidency of India, and which I have myself also received from Bombay (sent to me by Major Julian Hobson) as well as from Calcutta, sent to me by C. Curtoys, Esq.

PHOLCUS RIVULATUS.

Pholcus rivulatus, Sav. Egypte, pl. iii. fig. 12.

? *Pholcus ruralis*, Blackw. Ann. & Mag. N. H. (3) vol. i. p. 432.

Adult and immature examples of both sexes of this Spider were found in old buildings and under large stones at Alexandria and Cairo. A strong specific character, not before recorded, so far as I am aware, of the adult male, is furnished by a single longitudinal closely set row of short but distinct and rather strong black spines, reaching from near the base on the underside of the femora nearly to the anterior extremity of the tibiæ of the first pair of legs.

This Spider, described by Mr. Blackwall (*Pholcus ruralis, l. c. suprà*), is probably of this species.

Fam. THERIDIIDES.

Gen. LATRODECTUS, Walck.

LATRODECTUS EREBUS.

Latrodectus erebus, Sav. Egypte, pl. iii. fig. 9.

Adult females, with their large globular brown egg-cocoons, were found under stones among the ruins of an old building at Alexandria.

Dr. Thorell (Europ. Spiders, p. 95) rejects the derivation of Walckenaer's generic name *Latrodectus* from λάτρον, wages or reward, and δεκτός, received, as yielding no rational meaning for the name, and thence derives it from λάθρα, secretly, and δηκτής, biting. Those, however, who have looked most closely into the derivations of names given to genera and species of animals know best how very little rational meaning there is in a large number of them, in cases where the derivation is almost, and sometimes absolutely, certain.

In a well-known instance a species of Lepidoptera was named by a British author "decimella," merely because he had pinned it with a number-*ten* pin. Another instance is furnished by Baron Walckenaer himself, who named a Spider "Carolinum" for (there is no doubt) the excellent reason (?) that it had been found by his little son Charles (*Carolus*). Rather than impute to the Baron the manifest impropriety of writing *Latrodectus*, if he had really derived it from λάθρα, I would suppose that he had some reason to look upon the discovery of the type of his genus as the happy result of some trouble or difficulty, and thus gave it the name (rightly written *Latrodectus*) from the Greek words given as its derivation by Agassiz (Nomencl. Zool.) and rejected by Dr. Thorell, *i. e.* λάτρος (a form of λάτρον), wages or reward, and δεκτός, one meaning of which is *acceptable*. If this be "no rational meaning for the word," it appears to be, at any rate, more probable than the derivation given by Dr. Thorell. The derivation given by M. Simon, Hist. des Araignées, p. 177 (also rejected as irrational by Dr. T.), from λάτρευς, a workman, and δηκτής, a biter, would not be improbable, since we find that Walckenaer (Aranéides de France, p. 81, where he confers the name) remarks especially on the manner in which the Spider spins its snares for the entrapping of its prey beneath the stones.

Gen. LITHYPHANTES, Thor.

LITHYPHANTES HAMATUS.

Phrurolithus hamatus, Koch, Die Arachn. v. p. 105, pl. 206. fig. 507–8.

Lathrodectus hamatus, Cambr. P. Z. S. 1872, p. 288.

Adult females were found under stones near Alexandria in April 1864. It is an exceedingly variable species in respect to its markings: two of those met with had an entirely black abdomen; and the rest varied considerably in the extent and colour of the normal pattern; most probably the *Phr. lunatus* and *Phr. erythrocephalus* (Koch), *l. c.* fig. 509, 510, as well as *Latrodectus venator*, Sav. Egypte, pl. 3. fig. 11, and *Latrodectus ornatus*, Luc., Explor. in Algér. p. 233, pl. 14. fig. 8, are varieties of this species.

The chief, if not the only, difference between *Latrodectus* and *Lithyphantes* consists in the wide separation of the eyes of the lateral pairs of the former, whereas in the latter they are contiguous or nearly so.

Gen. STEATODA (Sund.).

STEATODA SIGNATA, sp. n.

Length of an adult female, 1½ line.

This Spider is of ordinary form and general characters; the cephalothorax, falces, maxillæ, labium, and sternum are of an orange-yellow colour tinged with brown; the *legs*, whose relative length appeared to be 1, 4, 2, 3, are rather short and slender; they are of a dull pale yellowish colour, furnished with hairs only, and the femora, especially of the first and second pairs, are strongly suffused with a dusky brown hue.

The *abdomen* is short, oval, very convex above, though rather flat on the upperside, abruptly rounded behind, and projects considerably over the base of the cephalothorax; it is glossy, and clothed thinly with fine pale hairs; its colour is a uniform kind of maroon or purplish red-brown, marked on the upperside with some elongate pointed oval pale dull yellowish markings, more or less covered with cretaceous white spots; three of these markings are situate on each side of the upper part, at equal intervals from the fore to the hinder extremity, the rest form a broken longitudinal central line on the hinder half. The four foremost of these markings form a large square whose fore side is a little shorter than the rest.

A single example of the female of this species, which at first sight very nearly resembles *Asagena serratipes* in the colour and markings of the abdomen, was found under a large stone at Alexandria.

STEATODA ? MANDIBULARIS.

Theridion mandibulare, Luc. Explor. en Algérie, p. 260, pl. 17. fig. 1.

Pachygnatha ? mandibularis, Cambr. Spid. Palest. and Syria, P. Z. S. 1872, p. 294.

Steatoda mandibulare, Sim. Bull. Soc. Ent. Fr. 1875, p. 222.

Epeira diversa, Bl. Ann. & Mag. N. H. Oct. 1859.

Adult males of this remarkable Spider were found running on the rails of the railway near Cairo, and females under stones near Alexandria.

In "Spiders of Palestine and Syria," *l. c. suprà*, doubts are expressed as to its generic place. It still appears to me that it can hardly be included in any hitherto characterized genus, though at present I hesitate to form a new genus for its reception. It is probably nearer to *Steatoda* than to any other; yet the very different form of the cephalothorax, in both sexes, appears to preclude it from that genus, to which, however, in deference to M. Eugène Simon's opinion, I now provisionally relegate it, in preference to *Pachygnatha*.

Gen. EURYOPIS, Menge.

EURYOPIS ACUMINATA.

Theridion acuminatum, Luc. Explor. en Algér. p. 268, pl. 17. fig. 10.

An adult female was found under a stone near Alexandria.

EURYOPIS SCRIPTA.

Theridion scriptum, Cambr. P. Z. S. 1872, p. 283.

Adult females were found under stones near Alexandria in April 1864.

EURYOPIS QUADRIMACULATA, sp. n.

This Spider resembles the two foregoing in respect of size, general form, and characters, but may be easily distinguished by a different distribution of colours on the abdomen. This part in the present Spider is of a deep brown-black colour marked with four elongate brownish yellow spots on the upperside, one at the fore and another at the hinder extremity, and another on each side, a little nearer to the fore than to the hinder spot; these lateral spots are the longest, and are placed obliquely, their inner extremities nearly meeting; the underside has a pale dull yellow transverse bar just behind the genital aperture, and another close in front of the spinners, the two being connected, or nearly so, by a longitudinal line of the same hue.

The *palpi* are short, the radial and cubital joints very short, but nearly equal in length; the digital joint is very large, and the palpal bulb well developed, a strong sinuous red-brown line (indicating, no doubt, the passage of an internal channel) may be seen on the outer side; and from the fore extremity there projects a strong, pointed dark red-brown corneous process, slightly curved and pointing backwards and a little outwards. An adult male and female were found near Alexandria under stones.

Gen. THERIDION, Walck.

THERIDION RUFOLINEATUM.

Theridion rufolineatum, Luc. Explor. en Algér. p. 260, pl. 16. fig. 10.

Theridion spirifer, Cambr. Zool. 1863, p. 8574, and P. Z. S. 1872, p. 280.

It appears, from a comparison of examples I have received from Algeria, pretty certain now that the Spiders referred to in the above synonyms are identical. Adult females were found on low plants near Alexandria in April 1864.

THERIDION VARIANS.

Theridion varians, Koch, Die Arachn. xii. p. 134, pl. 428. fig. 1056, 1057; Camb. P. Z. S. 1872, p. 280.

Adult females, of the same species as that found near Jericho in 1865, were found on low plants near Alexandria, and are, I think, quite correctly assigned to *T. varians*, Koch.

THERIDION SPINITARSIS, sp. n. (*Dipœna*, Thor. ?).

Adult female, rather more than 1½ line in length.

This Spider is of ordinary form, but of a stronger build than usual. The whole of the fore part is of a dull orange-yellow colour, the caput having a longitudinal central black stripe running from the eyes to the thoracic junction. The *legs*, whose relative length is 1, 2, 4, 3, are tolerably strong and moderately long; they are similar to the cephalothorax in colour, with the fore extremities of the tibiæ slightly marked with deep red-brown; they are more hairy than usual, the metatarsi being armed (particularly on their undersides) with long fine spines. The other joints also had, it is probable, originally been similarly furnished; but if so most of them had lost a great part of this armature by trituration.

The *abdomen* is oval, abruptly rounded, in profile, at its hinder extremity, and projects over the hinder slope of the cephalothorax; it is hairy, and of a yellow-brown colour thickly mottled with whitish-yellow cretaceous spots; the upperside has a broad longitudinal pale yellowish white dentated band running down the centre from the fore margin to the spinners, getting slightly narrower as it leaves the middle of the abdomen and goes backwards; on either side of the hinder extremity of this band there are some ill-defined dark red-brown markings. The sides are Vandyked by some fine red-brown lines, one of which crosses over the upperside near the middle, and two others over the fore part; the underside is of a dull yellowish brown colour, with a large, somewhat quadrate, yellowish white transverse band across the middle.

A single example of this Spider was found on a low plant near Cairo. In the absence of the adult male I hesitate to include it in the genus *Dipœna*, Thor., to which it will very probably be eventually found to belong.

THERIDION MELANOSTICTUM, sp. n.

Adult female, length 1⅔ line.

This pretty species is nearly allied to *T. denticulatum*.

The *abdomen* is large and globular, and projects considerably over the base of the cephalothorax; it is of a yellowish colour, pretty thickly mottled above and on the sides with white cretaceous spots, and also marked with black spots and markings. In some examples the upperside is likewise tinged with reddish brown, giving a kind of tortoise-shell-marked appearance. The unequal distribution of the white spots faintly indicates a longitudinal central dentated band, which decreases in width as it approaches the spinners; and the black spots are chiefly arranged in a longitudinal line on each side of this band. The sides are marked with a strongish curved black bar towards the fore extremity, between which and the spinners are two or three oblique black markings, sometimes consisting of a mere spot or two, sometimes of a short continuous line. The underside has a large somewhat oblong transverse patch in the middle, which (lying between its ends) appears to continue the curved lateral bars.

The *cephalothorax* is of a somewhat orange-yellow colour, strongly margined with dusky black, and with a similarly coloured longitudinal central bar from the eyes to the indentation where the caput and thorax unite. The clypeus equals two thirds of the facial space in height; it is prominent and divided longitudinally by a blackish bar.

The four central *eyes* form as nearly as possible a square; and those of each lateral pair are contiguous to each other, and obliquely placed on a tubercle; the intervals between the eyes of the foremost row appear to be as nearly as possible equal, while the interval between the fore central pair is greater than that between each and the fore lateral eye next to it.

The *legs* are long and slender, their relative length 1, 2, 4, 3, those of the first pair being considerably the longest; they are yellow (sometimes dull orange), the fore extremities of the joints being more or less extensively marked with dark reddish brown; their armature consists of hairs and bristles only, the latter being rather conspicuous on the tibiæ and metatarsi.

The *maxillæ* and *labium* are of normal form and similar to the cephalothorax in colour; the former have a largish dusky black patch on the outer side; and in some examples all the labium except the apex is of a similar colour.

The *falces* are not very long nor strong; they are similar to the cephalothorax in colour, and marked longitudinally with blackish along their inner sides in front.

The *sternum* is of a glossy blackish brown colour.

Several females, adult and immature, were found on low plants near Alexandria.

Gen. MIMETUS, Hentz (*Ctenophora*, Bl.).

MIMETUS MONTICOLUS.

Ctenophora monticola, Bl. Ann. & Mag. N. H. June 1870; Cambr. P. Z. S. 1872, p. 287.

A single female of this Spider was found on a prickly-pear plant near Cairo in January 1864, and is identical with those found in a similar situation at Beirût in the following year.

Gen. ERIGONE, Sav.

ERIGONE SPINOSA.

Erigone spinosa, Cambr. Spid. Palest. & Syr. P. Z. S. 1872, p. 292, pl. xiii. fig. 12.

Adult males of this very distinct species were found running on the metals and permanent way of the railroad near Cairo and Alexandria.

ERIGONE ALEXANDRINA.

Erigone alexandrina, Cambr. P. Z. S. 1872, p. 755, pl. lxv. fig. 11.

Both sexes of this minute Spider were found on rushes and other plants growing in a marsh near Alexandria.

Gen. LINYPHIA, Latr.

LINYPHIA EXTRICATA, sp. n. (Plate LIX. fig. 7.)

Adult male, length 1⅓ line.

This Spider, which is allied to *L. nigrina,* Westr., resembles it in form, general appearance, and colours.

The *cephalothorax* is of a dusky yellow-brown colour, with indistinct radiating brown lines following the normal grooves and indentations. The height of the clypeus rather exceeds half that of the facial space; and the profile line of the cephalothorax (including the hinder slope) forms a slightly curved line.

The *eyes* are very nearly equal in size and in two equally curved lines, the curves directed away from each other, thus forming a transverse oval figure; those of the hinder row are equidistant from each other, those of the fore central pair (which seem to be larger than the hind centrals) being near together but not contiguous to each other, the interval dividing them being a little less than that which separates each from the fore lateral eye on its side. The line formed by the fore centrals is a little shorter than that formed by the hind centrals; and each of the former is separated by an interval of its own diameter from the latter nearest to it; those of each lateral pair are seated, slightly obliquely and contiguously to each other, on a tubercle.

The *legs* are long, slender, their relative length 1, 2, 4, 3, of a pale yellowish hue tinged with brown, furnished sparingly with hairs and a few short fine spines.

The *palpi* are moderately long, slender, and of a similar colour to the legs; the cubital joint is short; the radial equally short, but produced at its fore extremity on the upperside, the termination being rather broader than the joint and evenly rounded; the digital joint is large, with a slight (and from some points of view angular) prominence at its base on the inner side, and a large prominent lobe on its outer side about the middle. The palpal organs are highly developed and complex: among the corneous processes of which they are made up, the normal curved one at their base is of large size and peculiarly characteristic form; sometimes it lies in close proximity to the rest of these organs; but generally it sticks out in a very noticeable way.

The *falces* are long and strong, divergent, and rather excavated on their inner sides near their extremities, where they are armed with several strongish teeth; they, as well as the *maxillæ*, *labium*, and *sternum*, are of a similar colour to the cephalothorax.

The *abdomen* is of a longish oval form, and projects a little over the base of the cephalothorax; it is of a brownish black colour, with a large pale patch just above the spinners, but not touching them.

The female resembles the male in colours; but the abdomen is larger and more globular, and the genital aperture is furnished with a strong curved epigyne which is directed prominently backwards; the relative length of the legs also differs in the female, those of the fourth pair being distinctly longer than those of the second pair.

Adults of both sexes were found on plants and shrubs both at Cairo and Alexandria.

Gen. PACHYGNATHA, Sund.

PACHYGNATHA ARGYROSTILBA, sp. n. (Plate LIX. fig. 8.)

Adult male, length 1 line.

The *cephalothorax* looked at in profile has a uniformly sloping and very slightly curved outline from the hind margin to the eyes; the area of the four central eyes is rather prominent. The clypeus, compressed close beneath the eyes, but rather prominent at its lower margin, equals in height half the facial space; it is of an orange-yellow-brown colour, with three longitudinal (but not very definitely outlined) dark yellow-brown bands; the lateral bands unite in front on the lower part of the clypeus.

The *eyes* are seated on tubercles, and do not differ greatly in size; the four central ones are the largest, and of very nearly uniform size, forming a square whose fore side is a little the shortest; the intervals between these eyes are scarcely a diameter; the eyes of each lateral pair are contiguous to each other on a single tubercle, the foremost being, if there be any difference, the smallest of the eight; the interval between each of these and that one of the four central eyes nearest to it in the same row appears slightly to exceed the interval between those of the central pair in that row.

The *legs* are long and slender, their relative length being 1, 2, 4, 3; they are of a dull yellowish colour slightly suffused with brown at the fore extremities of the tibiæ and metatarsi, and well furnished with rather conspicuous hairs.

The *palpi* are slender, and similar to the legs in colour. The cubital joint is short, nodiform at its base on the upperside, and constricted near its fore extremity; the radial joint is about equal in length to the cubital, but is much stronger, especially towards its fore extremity.

The digital joint is large, and of the same peculiar form as in others of the genus, the smaller division being of a somewhat S-shape; the palpal organs are very simple, consisting of a comparatively enormous and perfectly globular semidiaphanous dull orange-yellow bulb, with a small twisted process at its anterior extremity.

The *falces* are long, strong, divergent, and excavated towards their fore extremities on the inner sides, where they are also armed with two sharp strongish teeth; their colour is similar to that of the cephalothorax.

The *maxillæ*, *labium*, and *sternum* are of normal character, and of a dark yellow-brown colour.

The *abdomen* is of a short oval form, considerably convex above, but not nearly globular, and projects well over the base of the cephalothorax; it is of a dark yellowish brown colour mixed with blackish patches and markings above, and sprinkled thickly, both above and on the sides, with resplendent silvery markings and spots. These are generally gathered into a large, but not very long, longitudinal band or patch on each side of the fore half, the rest being more or less irregularly scattered, though in some examples they may be traced somewhat more regularly in transverse lines.

The female is rather larger than the male, and her abdomen is much more nearly globular in form; but in respect of colours and markings, the sexes are, as nearly as possible, similar to each other.

Two adults of each sex were found on rushes and other plants in a marsh near Alexandria.

Although much smaller than any yet known species of this genus, it surpasses all of them in beauty; the silvery spangled abdomen and enormous palpal bulb will serve to distinguish it at a glance.

Fam. EPEÏRIDES.

Gen. TETRAGNATHA, Latr.

TETRAGNATHA MOLESTA.

Tetragnatha molesta, Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 295.

Three adult males of this Spider were found among rushes in a marsh near Alexandria.

TETRAGNATHA NITENS.

Eugnatha nitens, Sav. et Aud. Egypte, p. 118, pl. ii. fig. 2.

An adult female, of what I believe to be this species, was found on rushes in a marsh near Alexandria.

The fangs of the falces are very remarkable, being strongly and rather abruptly bent not far from the middle, with a strong conical protuberance, or tooth, on the hinder side between the bend and the articulation with the falx.

TETRAGNATHA FLAVA.

Uloborus flavus, Sav. et Aud. Egypte, p. 117, pl. ii. fig. 1.

An immature example of this Spider was found in the same situation near Alexandria as the last two species. The position of the eyes misled Audouin as to its generic affinity, which is undoubtedly with *Tetragnatha*.

TETRAGNATHA FILIFORMIS.

Eugnatha filiformis, Sav. et Aud. Egypte, p. 120, pl. ii. fig. 4.

An immature male and two adult females of this species were found in the same situation as the last, near Alexandria. The great prolongation of the posterior extremity of the abdomen (increasing its length by two thirds) makes the determination of this Spider easy.

TETRAGNATHA PELUSIA.

Tetragnatha pelusia, Sav. et Aud. Egypte, p. 119, pl. ii. fig. 3.

An immature female, of what I believe to be this species, was found near Cairo.

Gen. SINGA, C. Koch.

SINGA AFFINIS, sp. n.

This Spider is similar in size, form, and structure to *S. albovittata*, Westr. (*Epeïra calva*, Bl.); but an apparently constant difference in the abdominal pattern, and in some other points, convinces me that it is of a distinct though very nearly allied species. The upperside of the abdomen in *S. albovittata*, has three broad longitudinal denticulate bands, the central one of a cream-white colour, and that on each side reddish yellow-brown; these latter unite at their posterior extremities, and thus form a transverse band at that part; these three bands are immaculate; the central one distinctly terminates well inside of the transverse portion of the lateral bands, represented on this portion, at most, by a small yellowish spot. In *S. affinis*, however, these bands are not so vividly traced, and the lateral ones are of a dull blackish-brown hue, broken in upon and mottled with pale yellowish white, and they are connected at their posterior extremities by a very narrow bar, or simple line, the central band thus running to the same length as the lateral ones; moreover the central band is divided longitudinally from end to end by a distinct tapering stripe of reddish brown (or other colour similar to that of the lateral bands) giving off lateral lines at intervals, which appear again to divide the central band in a transverse direction. The legs and palpi differ also from those of *S. albovittata* by being yellow, distinctly crenellated with brown; the falces also have a brown patch at each end, the legs and palpi of that species, as well as the falces, being of an immaculate orange-yellow. Another difference is observable in the four central eyes; these in the present Spider form an exact square, while in *S. albovittata* the form is of a quadrangle rather longer than broad.

Two females were found on low plants near Alexandria.

SINGA LUCINA.

Epeïra lucina, Sav. et Aud. Egypte, p. 345, pl. iii. fig. 4; Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 299.

Adult females of this Spider were found among rushes and plants in a marsh near Alexandria.

Mons. Eugène Simon (Arachn. de France, tom. ii. p. 123) states in a note that the *Epeïra lucina* of Savigny is no other than the *Singa hamata*, C. Koch (*Epeïra tubulosa*, Blackw., &c.). I think, however, that this is not so. In the figure given by Savigny a very constant specific character is delineated in the pale markings on the two dark longitudinal bands on the abdomen: in *S. hamata* these are represented by markings which always completely divide the dark bands in a transverse direction, while in *S. lucina* these markings are always confined within the band as shown in Savigny's figure, and as observed constantly in the examples found in Egypt, and also in many more found in Palestine. I do not at all doubt the occurrence in Egypt of *S. hamata*, C. K., though I did not myself meet with it either there or in Palestine; but, for the above reasons, independently of its larger size, I feel sure that it is not the same as *E. lucina*, Sav.

Gen. ARGIOPE, Sav.

ARGIOPE AURELIA.

Argiope aurelia, Sav. Egypte, pl. ii. fig. 5.

Adult females of this fine Spider were found, not unfrequently, in the gardens and orange-groves at Shoubra and other places near Cairo, sitting in the midst of their large orbicular snares.

ARGIOPE STICTICALIS, sp. n.

It is with some hesitation that I give here as a new species some immature Spiders swept up among low herbage near Alexandria. It is possible that they are but the immature form of *A. aurelia*. In these young examples the abdomen is of a less flattened form than in that species, and is destitute of the transverse banding so distinct in the adult (and nearly adult) forms of *A. aurelia*, the uniform covering of minute cretaceous white points being only broken by a dull longitudinal branching line and here and there a blackish marking. The legs also, instead of being, as in *A. aurelia*, very distinctly annulated with black, are simply black-speckled, chiefly on the femora, and especially on those of the first pair.

Gen. CYRTOPHORA, Sim.

CYRTOPHORA OPUNTIÆ.

Cyrtophora opuntiæ, Duf. An. Sc. Phys. tom. iv. pl. 69. fig. 3.

This Spider is abundant on the prickly pear, sont acacia, young date-palms, and other low trees and shrubs, near and above Cairo.

Gen. EPEÏRA, Walck.

EPEÏRA CHLORIS.

Epeïra chloris, Sav. et Aud. Egypte, pl. iii. fig. 5.

Adults of both sexes were found not unfrequently on low plants in Upper Egypt*.

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* The Spider described as an *Argiope* (*Argiope epeïroides*) in Spid. Palest. & Syr., P. Z. S. 1872, p. 301, but which is certainly not an *Argiope*, is very nearly allied to *Epeïra chloris*, Savigny; it is, however, larger, of an even more elongated form, and differs in the pattern on the abdomen, as well as in the structure of the palpal organs.

EPEÏRA SUSPICAX, sp. n.

Epeïra apoclisa, Sav. et Aud. Egypte, pl. iii. figs. 1, 2.

Having carefully compared adults of both sexes of this Spider, found on rushes in a marsh near Alexandria, with the European form of *E. apoclisa* (*E. cornuta*, Clk.), I am convinced that it is of a distinct species. It is much larger than any examples I have ever seen of *E. cornuta*, the length of the adult male being 4½ and 5 lines, and of the female nearly 7 lines; there are differences also, though slight, in the structure of the palpal organs of the adult male.

Inasmuch as the name *apoclisa* (Walck.) is now only a synonym of the older name *cornuta*, Clerck, it might have been well to distinguish the present Spider as *E. apoclisa*, Sav. et Aud.; but as, until lately, this specific name has been so long the one current for the European *apoclisa* (*E. cornuta*, Clk.), it will probably best avoid confusion to rename it as I have here done.

EPEÏRA PERPLICATA.

Epeïra perplicata, Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 300.

Adults and immature examples of both sexes were found near Alexandria.

EPEÏRA CIRCE.

Epeïra circe, Sav. et Aud. Egypte, pl. ii. fig. 9.

Immature examples, of both sexes, of what I believe to be this species were found at Alexandria.

EPEÏRA DROMEDARIA.

Epeïra dromedaria, Walck. Ins. Apt. ii. p. 126.

Examples of this Spider were found both near Alexandria and Cairo.

EPEÏRA ATOMARIA, sp. n. (Plate LIX. fig. 9.)

Adult male, length 2¾ to 1¾ lines; adult female, rather over 3 lines.

This Spider is nearly allied to *E. chloris*, Sav., particularly in the position of the eyes; but it may easily be distinguished by a decided difference of markings, as well as by its less-elongated form.

The *cephalothorax* is of ordinary form; its colour is yellow, clothed with rather coarse yellowish hairs, particularly on the caput; the oblique indentations, showing the junction of the caput and first thoracic segment, are broadly and distinctly marked with reddish brown.

The *eyes* are in the usual four pairs, rather small, and not very different in size; those of the hind central pair are near together (divided by about an eye's diameter), while those of the fore central pair are rather the largest of the eight and divided by a little more than two diameters, this interval being equal to that between each of them and the hind central eye on its side; the interval between each fore central and the fore lateral on its side is less than that between the fore centrals, while that between each hind central and the hind lateral on its side is very much greater than that between the hind centrals, being equal to about (or nearly) double the length of the line formed by these latter; those of each lateral pair are seated obliquely, but not quite contiguously, on a tubercle.

The *legs* are moderately long and not very strong; they are like the cephalothorax in colour, the femora being spotted with black, principally on their outer sides, the other joints are also marked and irregularly banded with black; they are furnished with hairs and spines; those of the second pair are distinctly longer than those of the fourth. In some examples the legs were more or less completely wanting in the black markings and spots.

The *palpi* are short and similar in colour to the legs; the radial and cubital joints are very short, the latter is prominent and somewhat angular on its upperside, where it is furnished with two long, strong, curved, tapering bristles; the digital joint is large, and of an elongate-oval form; the palpal organs are highly developed and complex, one of the corneous processes near their centre having two prominent, curved, horn-like spines.

The *falces* are moderate in length, but not particularly powerful; and their colour is yellow, with a large blackish patch near their base in front.

The *maxillæ* and *labium* are of normal form; and their colour is blackish, broadly tipped with pale yellow.

The *sternum* is oval, pointed behind; and its colour is blackish, marked with a broad, yellow, T-shaped marking on its fore part, followed near the middle by a somewhat diamond-shaped patch of the same colour.

The *abdomen* is of rather large size, and of a regular oval form, and projects considerably over the base of the cephalothorax; it is thinly clothed with hairs and bristles; some of the latter are long, of a pale yellowish colour, and of a spine-like character. Its colour is a straw-yellow, marked and spotted with black; the upperside presents a prettily freckled appearance, being thickly speckled with small black spots of different sizes, around the principal ones of which there is a slight clear space giving the appearance of an ocellated surface. Along the central longitudinal line of the upperside there is, usually visible, an indistinctly paler band, edged with a slightly dentated blackish line and narrowing as it approaches the spinners; this band is crossed towards its fore extremity by a distinct but irregular black linear marking reaching on each side to a longitudinal dentated black line; the dentations of these lines are bold, but bluntish; the underside of the abdomen is also spotted; there are likewise some other blackish markings, and some indistinct pale patches. In some individuals there is an indistinct pale transverse bar crossing the central one just behind the irregular black line mentioned above; these examples were of a generally sandy hue, the darker markings being reddish-brown instead of black, and the legs scarcely marked at all.

An adult female resembled these last in the general colouring; but her legs were entirely without darker markings; the abdomen also is less spotted, and the lines and bands noticed on the male (except the irregular transverse one on the fore part) are scarcely traceable; the sides are marked with oblique converging red-brown lines forming a vandyke pattern; and the underside is unicolorous.

Four males (three adult and one immature), and one adult female, were found on low bushes near Cairo and in Upper Egypt, and appear to me to be new to science.

Fam. ULOBORIDES.

Gen. ULOBORUS (Walck.).

ULOBORUS SIGNATUS, sp. n.

Adult male, length 1½ line.

The *cephalothorax* of this Spider is of a short or round oval form, the site of the fore central pair of eyes being rather prominent; it is uniformly though not very convex above, but, on the contrary, rather depressed and the hinder extremity truncated and higher than the fore extremity; its colour is dark brown, with an indistinct and abbreviated yellowish bar on either side, leaving a broad central brown band and a marginal band on each side of the same colour; these, however, all merge into one at the caput where the yellow bars cease. Clypeus none.

The *eyes* are in two curved rows wide apart from each other; and the curves of both are directed forwards; the eyes of the hinder row are equal in size, and as nearly as possible equidistant from each other; those of the fore central pair are rather larger than those of the hinder row, and separated by about the same interval as those of that row from each other, each fore lateral being also nearly the same distance from the fore central eye on its side; the fore laterals are the smallest of the eight, and each is separated from the hind lateral on its side by a larger interval than that which separates the fore and hind central eyes.

The *legs* are very unequal in length and strength; their relative length is 1, 2, 4, 3, those of the first pair being considerably the longest and strongest; those of the first two pairs are of a dark yellowish-brown colour, the femora being the darkest, and marked obliquely near the middle on the upperside with a yellowish stripe; those of the third and fourth pairs are of a yellowish colour broadly annulated with brown: the tibiæ of the first pair had the stumps, apparently, of spines; but all the armature, of whatever nature, had been broken and rubbed off.

The *palpi* are short, of a yellowish colour, marked obscurely with brown; the cubital and radial joints are very short, the latter being somewhat gibbous or pointedly prominent on its upperside at the fore extremity; the digital joint is rather large, and the palpal organs prominent but simple in structure, with, apparently, a fine red-brown spine coiled round them near the middle; this spine may perhaps be only the corneous margin of the posterior lobe of the palpal bulb.

The *falces* are small and of a yellowish colour; the *maxillæ* straight, short, broad, and rounded at the outer extremity; the *labium* is small and pointed at the apex; these parts are blackish brown, edged and tipped with pale whitish yellow; and the *sternum* is dark-yellow-brown and of an oval form.

The *abdomen* is oblong-oval in form, somewhat gibbous above from the middle forwards; its colour is black or nearly so; the fore half has a narrow white yellowish marginal stripe on the upperside; and on the hinder half are four small, but distinct, elongate yellowish-white oblique spots forming a square; another spot of a similar colour is placed just above the spinners; the underside has two longitudinal yellowish bands running nearly throughout its whole length. The spinners are compactly grouped, those of the inferior pair being longer and stronger than the superior ones, which are two-jointed; immediately in front of the inferior pair is the transverse surface of the inframamillary organs; but there are no calamistra on the legs, the latter being seldom (never in my own experience) found in the male sex.

A single example of this very distinct *Uloborus* was found on a low plant on the way up the Nile between Cairo and Sioût.

Fam. THOMISIDES.

Gen. THOMISUS, Walck. *ad partem.*

THOMISUS LATERALIS.

Thomisus lateralis, C. Koch, Die Arachn. iv. p. 43, pl. 120. fig. 277.

Adults of both sexes were found among rushes and other water-plants in a marsh near Alexandria.

THOMISUS SPINIFER.

Thomisus spinifer, Cambr. Spid. Palest. & Syria, P. Z. S. 1872, p. 308, pl. xiv. fig. 14.

Both sexes adult, and immature females, were found not unfrequently on low-growing plants and flowers, as well as on the boughs of the sont acacia between Cairo and Thebes.

Gen. DIÆA, Thor.

DIÆA DIANA.

Thomisus diana, Sav. et Aud. Egypte, p. 161, pl. vii. fig. 9.

An adult male, with females adult and immature, were found on the branches of the sont acacia at various places between Cairo and Thebes.

DIÆA CANDICANS, sp. n.

Adult male, length $1\frac{2}{3}$ line.

The cephalothorax, falces, maxillæ, labium, and sternum are of a pale dusky whitish yellow colour, the legs and palpi being still paler, and the abdomen creamy white.

The general form is rather less robust than that of *D. diana*, and the legs proportionally rather longer and more slender.

The *eyes* of the foremost row are *very nearly* equidistant from each other; while those of the hind central pair are perceptibly nearer to each other than each is to the hind lateral on its side; the interval between those of each lateral pair is greater than that between the fore and hind central pairs, owing to the rather greater length and stronger curve of the hinder row; the fore lateral eyes are largest of the eight; the height of the clypeus is less than half of that of the facial space.

The *legs* are furnished sparingly with hairs and spines—their relative length being 2, 1, 4, 3, the difference between 2 and 1 and 4 and 3 respectively being very slight.

The *palpi* are similar in colour to the legs and rather short; the radial joint is shorter than the cubital, and has its outer extremity very slightly produced and terminating with a very small, blunt, curved, brown, claw-like process; the digital joint is narrow, and about equal in length to the radial and cubital joints together; the palpal organs are not highly developed nor complex, but apparently consist of a single flattish oval pale yellowish lobe, upon the hinder part of which there rests a strongish, pale, curved spine springing from the outer side of the base of the lobe, and tapering to a sharp point on the inner side.

The *abdomen* is of a regular oval form, and projects pretty well over the base of the cephalothorax; its upper surface is flattish, of a nearly white cretaceous appearance, marked longitudinally from near the fore extremity by a narrow central bar, defined merely by a dull marginal line, and, tapering at each end, fining off to a single line a little way from the spinners; the five normal impressed spots are visible on the upperside, one at the fore extremity of the central bar, and four forming nearly a square figure behind it, the anterior side of the figure being rather shorter than the rest; the underside of the abdomen is unicolorous.

An adult female differed only in the legs of the first and second pairs being shorter than those of the male.

The above examples were found on low plants near Alexandria.

Gen. Xysticus, C. Koch.

Xysticus hirtus.

Thomisus hirtus, Sav. et Aud. Egypte, p. 164, pl. vi. fig. 11.

An adult female of this Spider was found near Cairo.

Xysticus promiscuus, sp. n.

Adult male, length $1\frac{2}{3}$ line.

This small *Xysticus* is nearly allied to *X. audax*, Koch; its general form, however, is shorter and broader, the cephalothorax being nearly circular save for the usual broad truncate form of the fore extremity of the caput; and the abdomen (which projects well over the base of the cephalothorax) is of a very short, broad, oval shape, obtusely pointed behind and slightly truncate before. The sides of the cephalothorax are thickly mottled with pale red-brown and yellow; the usual broad central longitudinal pale band, charged on its fore part with the normal spade-shaped marking, is yellowish red-brown, mottled finely with yellowish and fairly defined, at least at its hinder part, which is prolonged in a dark red-brown line down the hinder slope.

The *legs* are normal in respect of length and strength; they are marbled and streaked more or less coarsely with white, yellowish, and red-brown spots and blotches, and armed with spines, those on the tibiæ and metatarsi of the first and second pairs being rather long and strong; the metatarsi and tarsi are pale yellow, striped longitudinally with white.

The *palpi* are short and strong, of a pale yellow-brown colour, mottled faintly with whitish and darker brown: the radial joint is shorter than the cubital, and has its outer fore extremity produced into a short, tapering, bluntish-pointed apophysis, and a much larger one on its underside; this latter is broad and truncated at its extremity, which is broader than its base; the other (towards the inner side) is pointed: the digital joint is of a short oval form, with the usual apophysis issuing from near its base on the outer side. The palpal organs are very similar to those of *X. audax*, but may be easily distinguished by the form of the ┳-shaped spine: this in the present species is of a generally slenderer form, and has its shaft strongly bent, whereas in *X. audax* it is nearly or quite straight; the inner one of the cross bars also is longer in proportion to the other than in that species. The large pointed corneous process which issues from the inner side of the base of the palpal organs is also destitute of the thorn-like spine near the base of its lower edge, which is very conspicuous in *X. audax* and also in *X. cristatus*; in some respects this Spider appears to be more nearly like the latter in the palpal organs than the former; but whereas in *X. cristatus* the surrounding spine has its fine point always (so far as I have seen) straight, this in the present Spider is curved.

The *falces* are short, strong, subconical, and of a yellowish white colour, marked with red-brown, principally at the base and extremities.

The *sternum* is yellow-white, thickly speckled with pale purplish red-brown spots; and two oblique lines of the same colour are faintly visible on each side, with a similar short central line from the hinder extremity.

The *abdomen* is thinly clothed with erect bristles, and has its upperside of a pale chocolate red-brown colour, marked with a few black spots, chiefly near the margins, which are whitish and rugulose; the usual broad dentated band along the centre is visible and of a whitish colour, but greatly obscured by minute chocolate red-brown spots, the extreme points of the denticulations being the least obscured; about the middle of the denticulated band is a small, narrow, yellow stripe, pointed at each end, and its edges dark red-brown; the sides are rugulose, pale chocolate-brown, spotted with whitish and dark red-brown; the underside also is chocolate-brown, mottled finely with a deeper hue; the spinners are surrounded by a broken white line.

A female (which I feel no doubt is of this species) was of a generally paler and more ashy hue, but otherwise resembled it in form and markings.

Although so exceedingly closely allied to *X. cristatus* and *X. audax*, I have no doubt that the present is a perfectly distinct species, and that collectors will have but little difficulty in distinguishing it by its general appearance, apart from the special differences of the structure of the male palpi.

The examples above described were found on low plants near Alexandria.

XYSTICUS FERUS, sp. n.

Adult female, length $3\frac{1}{3}$ lines.

This fine but plainly-coloured Spider is allied to *X. bifasciatus*, C. Koch; its general form and structure are of the normal type. The *cephalothorax* is of an orange-yellow-brown colour veined and marked with red-brown, especially on the hinder slope; the ocular region and the middle of the clypeus whitish yellow; the normal spade-shaped marking, behind the eyes, is scarcely defined by an obscure yellow marginal line, its hinder extremity, however, being more apparent and of a whitish-yellow colour; from between the two hind central eyes to the beginning of the hinder slope, two parallel red-brown lines, close together, divide the caput longitudinally; the surface of the cephalothorax is thinly furnished with bristly hairs.

The *eyes* are in the ordinary position, and unequal in size, the fore laterals considerably the largest; those of the hind central pair are slightly larger, and nearer together than those of the fore central pair, the latter being further from each other than each is from the fore lateral on its side; while the eyes of the hind central pair are much nearer to each other than each is to the hind lateral on its side; the height of the clypeus is less than half that of the facial space.

The *legs* are not very long, but strong; they are yellow, marbled underneath, particularly the femora of the first and second pairs, with white, and furnished with hairs, bristles, and spines, the latter disposed in the usual way.

The *falces* are rather short, strong, but conical, similar in colour to the cephalothorax, with the anterior portion washed with yellowish white, and the front surface armed with strong black bristles.

The *palpi* are similar to the legs in colour, and furnished with bristles and spines.

The *maxillæ* and *labium* are of normal form, and, with the *sternum*, similar to the legs in colour; the *sternum*, however, is obscurely marbled with yellowish white.

The *abdomen* is oval, blunt, pointed behind and roundly truncated before, where it projects fairly over the base of the cephalothorax; it is of a generally dull sandy yellow-brown colour, and its upper surface furnished with short, strong, curved, black bristles; the sides and upper margins are very rugulose, the upper edges of the rugulosities more or less marked with whitish. The normal dentated, broad, longitudinal pale band on the upperside is scarcely visible; and the underside is rather paler than the rest.

A single example of this Spider, which I believe to be of an undescribed species, was found on a low plant near Alexandria.

XYSTICUS PECCANS, sp. n.

Immature female, length 1¼ line.

Although apparently far from maturity, I am induced to describe as a new species several examples found on plants in Egypt, believing that the specific indications afforded by their colours and markings will eventually be corroborated by the structural characters of the adult spiders.

The form of the *cephalothorax* is ordinary; and its colour is dull yellowish brown, darker on the sides than along the middle, and the ocular area dull greyish white, the lateral margins being very distinctly and regularly white.

The *eyes* are normal, but the fore laterals are proportionately larger than usual.

The *legs* are moderately long and tolerably strong, their relative lengths being normal; those of the first and second pairs (except the tarsi, which are pale yellowish) are of a dark brown with a chocolate tinge, most uniform on the tibial, metatarsal, and femoral joints; those of the third and fourth pairs are a uniform pale yellowish, which is also the colour of the palpi, maxillæ, labium, sternum, and abdomen. The latter is of a roundish oval form, and (in all the examples found) entirely destitute of markings; probably, however, this will not be found to be so in the adult examples, in which we may expect to find, though perhaps not very definitely, the normal pattern delineated.

The *falces* are short, strong, and subconical, of a yellowish colour, with a broad, distinct, transverse white band near the middle of their fore side.

XYSTICUS SUBCLAVATUS, sp. n.

Adult female, length 2⅓ lines.

This Spider is closely allied to *X. hirtus* (Sav.).

The *cephalothorax* has its sides mottled and marked with yellowish white, and yellow-brown of different shades; a broad longitudinal pale whitish band occupies the middle; and along it, from and including the eyes of the hind central pair, runs a yellow-brown bar tapering to a point a little way down the hinder slope.

The *legs* are whitish, mottled and spotted with yellow, and with yellow-brown spots and markings; the tibiæ and metatarsi of the third and fourth pairs have each a distinct, although broken, dark blackish-brown annulus.

The *abdomen* is roundly truncated before, and broader behind than in front; it is of a whitish hue, marked and mottled above with pale yellow-brown and a few blackish markings; on its hinder half these are arranged in two well separated longitudinal lines, and indicate the spaces between the denticulations of the ordinary broad central longitudinal band, which is otherwise scarcely traceable; the sides are rugulose and marked with some rather indistinct oblique rows of brown spots; and the underside is faintly spotted with yellowish-brown; besides some ordinary bristles on the upperside, there are on each side of the fore part a few strong curved clavate ones in an obliquely longitudinal line; these bristles increase gradually in strength from the base to the rounded extremity, something like the form of a racket-bat: there may have been others originally; but if so, they had been rubbed off before capture. Several of these bristles, as well as some others, equally strong but not clavate, are also apparent on the cephalothorax.

A single adult female was found near Alexandria.

Gen. SELENOPS, Duf.

SELENOPS ÆGYPTIACA. (Plate LIX. fig. 10.)

Selenops ægyptiacus, Sav. et Aud. Egypte, p. 162, pl. vi. fig. 6.

This Spider appears to be tolerably abundant in the Nile boats; it used frequently to be seen at night in the cabins and passages of our daha-beah, but, owing to its swift movements and the numerous cracks and crevices at hand, it was very difficult to capture it; I managed however, to obtain three adult and immature females and several adult males. As no other species was met with during my stay in Egypt, I conclude that this is probably the one described and figured by Savigny and Audouin, though the example from which their figure and description were made, being immature, gives but little idea of the characteristics of the species. A more detailed description from the adult form will therefore be useful.

Adult male, length $4\frac{1}{2}$ to a little over 6 lines; adult female, 6 to $7\frac{1}{2}$ lines. The Spider with legs extended covers a width of two inches and three quarters.

The *cephalothorax* is slightly broader at its widest part than it is long; its form is very nearly that of a heart, the ocular region forming the acute point, which, however, is here truncated; it is flat and level throughout, the caput being only a little constricted laterally; its colour is yellow-brown (the caput being darker than the rest, as also are the normal converging grooves and indentations), and it is clothed with hairs and a yellowish grey pubescence.

The *eyes* are unequal in size and disposed on tuberculate black spots along the whole width of the fore margin of the caput; four form a curved row in the middle, the curve directed forwards; and at some little distance from each end of this row is a lateral pair, the eyes of which are very unequal in size, wide apart, and placed obliquely, so that the hinder eye, which is the largest of the eight, is much further from the curved row than the foremost one, which is smallest of the eight: the hinder eyes of the lateral pairs follow the same curve as the four middle ones; but the interval between each and the end one of the central curve is as great as that between the latter and the next to it but one: the interval between the two middle eyes of the central curved row is greater than that between each and the end eye nearest to it; these end eyes are also rather larger than the middle ones. Owing to the flatness of the caput and the nearness of the eyes to its fore margin, the clypeus is very low, no more than equal to the diameter of one of the middle eyes of the central curve.

The *legs* are long, moderately strong, and not greatly unequal in length; their relative length is 2, 3, 4, 1; they are of a dull yellow tinged with brown, and more or less distinctly annulated with darker yellow-brown; they are furnished slightly with a greyish yellow pubescence, which sometimes obscures the darker annulations, and also with hairs, bristles, and spines of various lengths. Each tarsus terminates with two curved claws, which appear to be devoid of pectination; and beneath them is a small but compact scopula of black hairs.

The *palpi* are short, similar to the legs in colour, except the radial and digital joints, which gradually deepen into a dark reddish yellow-brown: the radial joint is nearly of the same length as the cubital, and has, near its outer fore extremity, a prominent dark red-brown somewhat corneous looking apophysis of a tapering, but not very acute, pointed form; on the inner side, towards the fore extremity of the radial joint are several long spine-like bristles; the cubital joint has a single bristle on the upperside at the fore extremity; and the humeral joint has several spine-like ones about the same part; the digital joint is of good size and of a regular oval form, but does not equal in length that of the radial and cubital together by about one half of the latter; the palpal organs are well developed, but not very complex, nor presenting any thing very remarkable in their structure.

The *falces* are moderate in length and strength, rather prominent in front, rounded in profile, and of a deep red-brown colour, paler reddish-yellow near the fore extremity on the inner sides; they are furnished with longish bristly hairs, and appear to have one or two sharp teeth on their inner margins; the fangs are powerful, strongly curved, and of a deep red-brown colour.

The *maxillæ* are strong, straight, and obliquely and roundly truncated at their extremities; their colour is yellow red-brown, softening to pale yellow at their extremities.

The *labium* is equal in length to half that of the maxillæ; it is of an oblong form, rounded at the apex, where it is of a pale yellowish colour, the rest being reddish yellow-brown; the upper half is apparently wider than the lower.

The *sternum* is of a dull yellow colour, and nearly circular in its shape, its fore margin is a little flattened, its hinder extremity notched, and its surface is furnished with hairs.

The *abdomen* is very flat, of an oval form, truncated before, and blunt behind; its colour is a dull testaceous yellow, clothed with hairs of various dull yellowish brown and black hues; those just below the fore margin are upturned, black, and bristly; the upperside is marked with blackish spots, some of which form two longitudinal lines, an oblong marking along the middle of the fore half, following which, on the hinder half, are two or three more or less well-defined transverse lines, the middle portion of the second of these lines being strongly curved; around the margin of the hinder extremity are some small pointed tufts of pale whitish yellow hairs. The spinners are small and short, and, together with the anal tubercle, are partially concealed within a kind of circular sheath, which may be seen when in a rather protruded state in some examples; but in others it is quite invisible; it is probably an exaggeration or more developed form of this peculiarity of which Baron Walckenaer speaks with respect to *Selenops omalosoma*, Duf., and is no doubt a remnant of the once segmented abdomen of the Araneidea. The general form of *Selenops* is strikingly like that of *Phrynus*, the nearest ally to the true Spiders; and it is not surprising therefore that the segmented form of abdomen in the former should be more visible in the present than in most other known Spiders.

This Spider is probably common in houses in Egypt, though I did not myself meet with it except in the Nile boats. According to the sailors' account, it preys upon the cockroaches with which these boats are generally infested.

The female differs from the male only in being larger and with shorter and stronger legs. The exceedingly flattened form of this Spider, which runs with inconceivable quickness, and with its legs extended flat on all sides upon the surface, enables it to glide in an instant through cracks and crevices so narrow as to have escaped observation until the Spider disappears, as if by magic, through the wainscoting of the boat. The only way in which I succeeded in capturing this Spider was by observing it when undisturbed and motionless for an instant, and then placing an inverted tumbler over it, when a piece of paper passed carefully behind, put it completely in my power, and enabled me to chloroform and secure it without the slightest damage to the specimen. I have an adult male of this species from Old Calabar, on the west coast of Africa; this example only differs in having the abdominal markings more distinct than in the Egyptian specimens.

Gen. SPARASSUS, Walck.

SPARASSUS WALCKENAERIUS.

Sparassus walckenaerius, Sav. et Aud. Egypte, p. 159, pl. vi. fig. 1.

Although not rare in Egypt, I was not able to obtain an adult example of either sex of this fine Spider; no doubt their period of maturity occurs later on towards the summer season, the time when my examples were found being in January and February; the length of the largest example met with (an immature female) is 13 lines. Among other situations in which this species was found, it used to occur on board the daha-beah. Waking up on one occasion in the middle of the night, I heard a crunching and crackling noise close to my head; and on looking round, close to my ear was a large Spider, and a still larger Cockroach in deadly struggle together. To stretch out my hand softly and reach a large chip-box close by and enclose them within it was the work of a moment; but on looking in the next morning, the Cockroach had disappeared, all except the harder parts, which were reduced to small fragments. I gave the monster several days to digest his meal and think upon things in general, and then, after a dose of chloroform, consigned him to the collecting-bottle.

Savigny's figure of this Spider is so good that it is impossible to err in the determination of the species.

SPARASSUS COGNATUS, sp. n.

The examples of this Spider met with are not nearly so large as those of *S. walckenaerius*—though, not having met with either species in the adult state, this cannot be considered any certain proof of their relative size when arrived at maturity.

The following differences will serve to distinguish the two species. In the present one the cephalothorax is of a plain yellow colour entirely devoid of the brown markings so characteristic in *S. walckenaerius*; the legs also are completely destitute of the darker annulations which are more or less visible in all the examples I met with of that species; the central eyes also of the hinder row in *S. cognatus* are as widely separated from each other as each is from the hind lateral eye on its side, or perhaps a trifle more widely, while in *S. walckenaerius* the interval between the hind centrals is a trifle less than that between each and the hind lateral on its side. Also the dark markings on the abdomen in *S. cognatus* are of a red-brown colour (often of a bright rusty red), while those on *S. walckenaerius* were of a dull brown hue.

Examples of this Spider were met with both near Cairo and in Upper Egypt. Possibly it may be the immature form of *Sparassus linnæi*, Sav.; but at present I am inclined to think otherwise.

SPARASSUS SUAVIS, sp. n.

Adult male, length $3\frac{3}{4}$ lines; adult female, $4\frac{1}{2}$ lines.

The *cephalothorax* of this Spider is broader than long, though constricted and truncated at its fore extremity; the profile line of the upperside describes a slight and uniform curve; it is of a dull orange-yellow colour, clothed with greyish yellow hairs, and marked faintly with dusky brown in the normal grooves and indentations; the height of the clypeus scarcely exceeds the diameter of one of the fore central eyes.

The *eyes* are in two curved rows, the curves directed away from each other, the hinder row being the most curved and the front row the shorter; those of the fore central pair are largest of the eight; those of the hind central pair are further from each other than each is from the hind lateral on its side, while those of the foremost row are equally separated from each other, the four central eyes describing a square whose fore side is shorter than the rest: the interval between those of each lateral pair is about equal to the diameter of one of them.

The *legs* are long, and moderate in strength; their relative length is apparently 2, 1, 4, 3, or 2, 4, 1, 3; their colour is yellow, the undersides of the femora of the first and second pairs being speckled with small red-brown spots, chiefly disposed in two longitudinal parallel lines; they are furnished with hairs and a few long spines (of different lengths); and the metatarsi and tarsi are furnished beneath with a scopula.

The *palpi* are moderately long and strong; they are similar to the legs in colour; the humeral joints are furnished with a few spine-like bristles towards the fore extremity on the upperside; and there are a few finer long bristles on the other joints: the radial joint is double the length of the cubital, and has a tolerably long, slightly curved, deep red-brown and rather slender apophysis at its extremity on the outer side; this apophysis is of a slightly tapering form, but is obtusely pointed: the digital joint is elongate-oval in form, rather longer than the radial and cubital joints together; its colour is yellow-brown; and it is hairy, terminating in a single small curved claw: the palpal organs are small and simple, and, although characteristic, present no noteworthy processes, nor do they extend more than halfway towards the extremity of the joint.

The *falces* are moderate in length and strength, straight, though projecting a little forwards, and rounded in profile; they are of a yellow-brown colour, paler on their inner sides towards the extremity.

The *maxillæ* are moderately long and strong, nearly straight, and roundly truncated at their extremities, their colour is dull yellow-brown, but pale at the extremities.

The *labium* is very short and small, and nearly semicircular in form, of a dull yellow-brown colour, pale at the apex; and the *sternum* is yellow.

The *abdomen* is of an oblong-oval form; its colour is a dull testaceous, more or less mottled on the upperside with clearer yellow cretaceous spots, and it is thinly clothed with greyish yellow hairs; an ordinary elongated, central, longitudinal yellow-brown marking, defined by a margin of bright red-brown spots, occupies the fore half of the upperside, and its acute termination is continued by a single line of similar spots to the spinners; a few other small spots of the same colour are thinly but pretty evenly dispersed over the rest of the upper surface; the underside is immaculate.

The *female* resembles the male, except in being of a stouter build; the genital aperture is small, of a somewhat heart-shaped and characteristic form, with a blackish red-brown corneous margin.

An adult and an immature male and an adult female were found at the roots of scattered tufts of herbage on the desert near Gebel y Silsilis, in Upper Egypt. Although nearly allied to *Sparassus linnæi* (Sav.), it may be at once distinguished not only by a difference in the relative sizes and position of the eyes and its *much smaller size*, but by the speckled appearance of the abdomen, and the spots on the femora of the first two pairs of legs; the markings on the abdomen of *S. linnæi* being much larger and of a linear character; the palpal organs also, in that species, extend much nearer to the fore extremity of the digital joint, besides being quite different in structure; the radial joint also is shorter in proportion to the cubital, and is armed with two or three long and rather strong spines.

Gen. ARTAMUS, L. Koch (changed to *Artanes* by T. Thorell).

ARTANES BIGIBBA, sp. n.

Immature female, length 2½ lines.

The *cephalothorax* is of the ordinary form; it is of a yellowish grey colour, more or less completely mottled and suffused with yellowish brown, generally leaving a not very distinct pale patch on each side of the hinder part of the caput.

The *eyes* are small and in the usual position; those of the hind central pair are further from each other than each is from the hind lateral on its side; and the relative position of the eyes of the front row is similar; both rows are curved, the convexity of the curve directed forwards; but the front row is much the shortest, and most strongly curved.

The *legs* are long and moderately strong; their relative length being 2, 4, 1, 3; they are of a pale yellowish hue, more or less mottled and suffused with white; and the femora of the first pair are marked rather underneath in front with a strongish longitudinal stripe of deep chocolate-brown (in some examples almost black); in some examples the legs have an obscurely annulate appearance; the tibiæ and metatarsi of the legs are furnished with longish spines.

The *palpi* are similar in colour to the legs; and the humeral joints of those of the first pair have a large black spot underneath the fore extremity.

The *falces* are short, straight, vertical, subconical, of a whitish-yellow colour, tipped with yellow-brown.

The maxillæ and labium are of the normal form, and, with the sternum, of the same colour as the falces.

The *abdomen* is of a somewhat subpentagonal form, truncate before, and broadest towards the hinder extremity, which, however, is of a somewhat pointed form; at its broadest part on either side at the margin is an obtuse gibbosity or protuberance, which, together with the sides and the hinder part, has a wrinkled appearance after preservation in spirit of wine; the colour of the abdomen is greyish white mixed with yellowish grey-brown, and in some examples with chocolate red-brown, assuming an indistinct pattern of a longitudinal central line on the fore half, which emits a short lateral oblique line from either side near its middle, followed by two or three subangular transverse lines, or chevrons.

Four examples, all females and immature, were found among herbage near Alexandria.

ARTANES LUGENS, sp. n.

An immature female of this Spider is rather smaller than those just described of *A. bigibba*, and, although strikingly similar in general form, colouring, and structure, differs from that species in (apparently) the larger size of the eyes of the hinder row; the legs, also, are speckled with dark brown or blackish spots, the longitudinal dark stripe on the fore femora being absent: the *abdomen* also has scarcely any trace of the two gibbosities noticed in that species; the colour of the upperside is a clear greyish white, with a large oblong somewhat rectangular black area reaching from the fore margin to about two thirds of the way to the spinners; this black figure is rather constricted in the middle, and is closely followed towards the spinners by a transverse, slightly angular stripe, or chevron, close behind which is a single central black spot; on either side, close to the spinners, is a short black marginal stripe; the underside is unicolorous, and of a dull greyish white hue.

A single example of this Spider was found near Alexandria. Future researches alone will prove whether or not it is only an abnormally coloured example of *A. bigibba*; at present I consider it to be of a distinct though nearly allied species.

Gen. THANATUS, C. Koch.

THANATUS ALBINI.

Philodromus albini, Sav. et Aud., Egypte, pl. vi. fig. 4.

Adult examples of both sexes of this Spider were found in various parts of Egypt, among low herbage and running on bare spots.

THANATUS LINEATIPES, sp. n.

Adult female, length 3 lines.

This Spider belongs to the group typified by *T. oblongus*, upon which M. Simon has founded a separate genus, *Tibellus*. So far as I can see, the chief, if not the only, valid distinction from *Thanatus* is the elongate narrow abdomen—which seems scarcely enough for the construction of a new genus, although a convenient character for the separation of a group within the genus *Thanatus*.

The whole of the fore part of the present Spider is pale yellow. The *legs* are furnished with a few fine spines; and the femora of the first and second pairs are thinly spotted with minute blackish specks; the tibiæ and metatarsi of the first, second, and third pairs are marked on the hinder sides with a single longitudinal black line, while the same joints of the fourth pair have a black line along both the fore and hinder sides. The *palpi* are immaculate.

The *abdomen* is of an elongate oval form, but not so narrow as that of *T. oblongus*; it is of a pale yellowish colour, closely and uniformly covered with yellow-white cretaceous spots, having only a pale dull-coloured elongate tapering central marking along the middle of the fore half on the upperside; from this marking there issue several fine oblique lines of a similar colour. The relative length of the legs is 4, 2, 1, 3; and the position of the eyes is exactly like that of *T. oblongus*.

A single example was found on a low plant near Cairo.

THANATUS FLAVUS, sp. n.

Adult female, length 2½ lines.

In size, colours, and general appearance this Spider is strikingly like *T. lineatipes*; the form, however, of the abdomen is a little different, tapering more uniformly from the fore part to the spinners; the cephalothorax has two broad but indistinct lateral longitudinal brownish bands, one on each side, leaving a marginal band of the normal ground-colour on either side, of the same width; the legs are more or less thinly speckled with blackish specks, and none of them have the black lines so characteristic in *T. lineatipes*.

The form of the genital aperture also differs from that species; nothing, however, but a drawing of each would render the differences of this aperture tangible for the purpose of specific determination.

Four adult females were found on low plants in a marsh near Alexandria.

THANATUS FLAVESCENS, sp. n.

Immature female, length 3 lines.

Strikingly like both the foregoing species in colours, this one may be at once distinguished by the more attenuated cylindrical form of the abdomen, and consequently its greater length; the abdomen tapers a little, and very gradually, to the hinder extremity, it is of a clear straw-yellow colour, and has the faintest indication of a longitudinal central stripe throughout the upperside, formed by two gradually converging dusky broken lines; the cephalothorax is yellow, slightly speckled with black, chiefly on the caput; the legs are the same in relative length, and have only a very faint indication of black speckling: the two posterior eyes (the laterals of the hinder row) are in the present species further removed backwards from the rest than in the two former, the central pair of the same row being also smaller.

An immature male and female were found on a low bush near Cairo.

Gen. PHILODROMUS, Walck.

PHILODROMUS ADJACENS, sp. n. (Plate LIX. fig. 11.)

Philodromus fabricii, Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 310 (exclude reference to Savigny).

Adult male, length 1⅓ line; adult female, 2¾ lines.

Subsequent examination and comparison have led me to believe that the Spider recorded (*loc. cit. supra*) is distinct from *Philodromus fabricii*, Sav. et Aud., differing from it in the more truncate termination of the very conspicuous dark marking on the fore half of the upperside of the abdomen, as well as in the relative length of the legs; in the present Spider this is 4, 3, 2, 1, while in *P. fabricii* it is 4, 2, 3, 1. The structure, however, of the palpal organs of the male is not very unlike the figure shown in Savigny's work.

The *cephalothorax* is of ordinary form, of a yellowish grey colour, with two very distinct broad lateral longitudinal (but not marginal) dark-brown bands; these bands, however, touch the margin at the point where they terminate in front, close to the junction of the caput and thorax, behind which their lower margin is rather strongly denticulate.

The *legs* are very long and slender; their relative length is 4, 3, 2, 1; and their colour is pale whitish-yellow, more or less spotted and marked beneath the femora with greyish yellow-brown; and they are furnished with hairs and a few inconspicuous spines.

The *palpi* are similar to the legs in colour; the radial and cubital joints are short, but of equal length; and at the outer extremity of the former is a slightly curved, tapering, narrow, pointed brown apophysis; the digital joint is oval, rather longer than the radial and cubital joints together; the palpal organs are simple in structure, with a slightly curved pointed corneous process, which begins on their inner side, and projects, with a sharp black point, from their extremity.

The *abdomen* is oval, and projects well over the base of the cephalothorax; its fore extremity is rounded, and its posterior extremity blunt-pointed; it is of a dull cream-grey colour, with the normal marking on the fore half of the upperside very distinct and well defined and of a deep brown colour, with an angular point near the middle on each side, and truncated or blunt-pointed at its hinder extremity, from each corner of which there projects sometimes a very short oblique dark brown line or point; the sides of the abdomen are obscurely marked and mottled with brown; but the rest of the surface scarcely shows any trace of colour in markings.

The *female* resembles the male in colours and markings, but is much larger; and the legs are shorter, and their relative proportion appears to differ, being in this sex 4, 2, 3, 1; the difference, however, if any, between those of the second and third pairs is exceedingly slight.

Adults of both sexes were found in desert places near Alexandria, where they were very difficult to be seen except when moving, owing to the exact adaptation of their colours to the surface of the ground; and when moving they were exceedingly difficult to capture, owing to the swiftness of their movements.

I feel no doubt that these are identical with the species recorded from Palestine, although in all the male specimens and some of the females obtained there, besides the markings above noticed, the remainder of the upper surface of the abdomen is marked more or less distinctly with yellowish brown, forming on the hinder half a somewhat regular, tapering pattern, denticulated on its outer margins, sometimes divided by an indistinct pale longitudinal stripe, and sometimes with several transverse curved or slightly angular dark lines, more or less visible; the *cephalothorax* also often has the space between the dark lateral bands occupied by a longitudinal tapering dark stripe; and the legs are of a generally darker and more suffused hue. In fact, it would be correct to describe the Egyptian examples as bleached or washed-out specimens of the Palestine species. I can, however, see no difference between them in any structural points.

PHILODROMUS MEDIUS.

Philodromus medius, Cambr. Spid. of Palest. & Syria, P. Z. S. 1872, p. 311.

An adult male, with females, both adult and immature, were found in Upper Egypt, upon the lower boughs of the sont acacia.

PHILODROMUS CINEREUS, sp. n.

Adult female, length 2 lines.

The *cephalothorax* is pale yellow, the sides (except a narrow marginal white line) yellowish brown, divided longitudinally by a broken curved line of three indistinct whitish elongate spots, and marked along the course of the normal indentations with converging black lines, among which are a few other small spots of the same colour; the upper part of the caput is dull yellowish brown, margined strongly behind with white, on the posterior edge of which are two or three deep-black-brown spots; the clypeus is white, and its height is equal to half that of the facial space; the ocular area is also white.

The *eyes* are in the usual position, but are rather more unequal in size than usual, those of the fore central pair being decidedly the largest and considerably further from each other than each is from the fore lateral eye on its side, the interval between each and the latter being rather less than the latter's diameter; the four central eyes form a square whose hinder side is longer than the rest.

The *legs* are rather long and slender, their relative length is 2, 4, 3, 1; they are pale yellow in colour, annulated and speckled more or less with blackish brown, and furnished sparingly with hairs and a few very fine inconspicuous spines.

The *palpi* are moderately long, slender, and similar to the legs in colour.

The *falces* are of moderate length, but slender, and of a brownish-yellow colour.

The *maxillæ* and *labium* are normal in form, and similar to the falces in colour, but tipped with a paler hue.

The *sternum* is yellow, marbled with white.

The *abdomen* is rather large, broader behind than before; it is of an ashy grey colour, thickly suffused with darker grey and black specks on the upperside; the normal marking along the centre of the fore half is of a blackish grey colour, well defined by a black marginal line, truncate at its hinder extremity, and emitting an indistinct black oblique line from either side of its broadest part, which is slightly angular; the hinder part is marked by some obscure whitish markings and spots disposed in opposed oblique broken lines on either side; the genital aperture is characteristic, and of a somewhat oval or kidney-shape, divided by a narrow longitudinal septum; a little way underneath, in front of the spinners, is a small but very distinct transverse slit or opening, probably the orifice of a portion of the tracheal system.

A single example only was found near Cairo. Probably other examples would show some variation in the distinctness of the markings; but even from this one example it appears to me to be a very distinct species.

PHILODROMUS VENUSTUS, sp. n. (Plate LIX. fig. 12.)

Adult male, length not quite 1½ lines; adult female, rather more than 2 lines.

The *cephalothorax* of this pretty and very distinct species has a broad central longitudinal yellow band, as wide as the length of the hinder row of eyes, including most of the ocular area, and with a paler angular bar at the hinder part of the caput, the angle directed backwards; the sides and clypeus, excepting a narrow marginal cream-white line, are of a rich dark brown colour, somewhat curvidentate on the lower edge; and on either side of the caput, just below each end of the ocular area, is a yellowish spot; the height of the clypeus equals half that of the facial space.

The *eyes* are in the ordinary position; those of the fore central pair are rather larger than the rest, and are much further from each other than each is from the fore lateral eye on its side; the four central eyes describe a square whose fore side is the shortest.

The *legs* are long and rather slender, their relative length being 2, 1, 4, 3, or 2, 4, 1, 3; they are yellow, broadly banded and otherwise slightly marked with a brightish brown, but most distinctly and darkly on those of the third and fourth pairs; they are also furnished with hairs and a few fine inconspicuous spines.

The *palpi* are rather short, and similar in colours and markings to the legs; the radial and cubital joints are short, but of about equal length, the former being furnished with several spines and a small pointed corneous apophysis at its extremity on the outer side; the digital joint is rather long and of a narrow oval form and yellow-brown colour; the palpal organs are very simple, consisting apparently of an oval lobe without any noticeable processes.

The *falces* are moderate in length and strength, straight and subconical, of a yellow colour, with two reddish black-brown patches in front of each, one near the base, the other towards the extremity; in fact the base is more or less reddish black-brown all round.

The *maxillæ* and *labium* are of the usual form and, with the *sternum*, of a pale yellow colour; the latter has an elongate triangular black spot at its hinder extremity.

The *abdomen* is of an oval form, pointed behind and somewhat flattish above; it is of a bright buff colour, the upperside margined on each side, but not quite to the hinder extremity, with a deep-black-brown well-defined stripe, edged on the inner side with cream-white; from the fore extremity a short black-brown central stripe runs a little way along the ordinary marking, which is of a much paler colour and ill defined; and from a little way above the spinners a narrow cream-white stripe runs nearly to the extremity of the ordinary marking; the ground-colour of the abdomen deepens in its hue on each side of this white stripe, becoming of the same colour as the lateral stripes at its hinder extremity; the underside is pale buffish yellow, marked with two longitudinal brownish lines, which converge a little towards each other as they get near the spinners.

An adult female differed only in being of a darker and more suffused hue, the different lines and markings being not quite so vivid.

An adult example of each sex, with an immature female, were found on the branches of the sont acacia, during the ascent of the Nile, between Cairo and Manfaloot.

Fam. LYCOSIDES.

NILUS, gen. nov.

Cephalothorax short, broad, and with very slight lateral constrictions at the caput.

Eyes not very large nor very unequal in size, occupying the whole width of the upperside of the caput, in two not very widely separated, and almost equally curved, transverse rows; the convexity of the curves is directed forwards, but the front row is the shortest.

Legs tolerably strong, not very long nor very unequal in length; their relative length 4, 1, 2, 3, or 1, 4, 2, 3; each tarsus ends with three curved claws.

Maxillæ moderately long, straight, broader at their extremity than at their base, and rather roundly truncated.

Labium short, scarcely half the length of the maxillæ; lateral margins slightly curved, and apex rounded,

Abdomen short, oval, rather pointed behind, and projecting considerably over the base of the cephalothorax.

NILUS CURTUS, sp. n. (Plate LX. fig. 13.)

Immature female, length rather more than 2 lines.

The *cephalothorax* has a rather abrupt hinder slope, and the profile-line of the caput and thorax to the hinder slope is level; its colour is yellow-brown, the ocular area, including a large somewhat quadrate area behind it, being yellow, the quadrate area having two indistinct brownish patches near its hinder part; the clypeus is yellow, with two brown patches opposite the middle of the base of the falces, and its height scarcely equals half that of the facial space; on each side of the cephalothorax is a well-defined, straight, yellow, but not very broad stripe, reaching from the hinder extremity quite to the insertion of the falces, and below it is a broad yellow-brown marginal band.

The *eyes* are seated, in the form of a crescent, on largish black tuberculate spots; the lateral eyes of the hinder row are the largest, and the fore laterals the smallest of the eight; the interval between those of the hind central pair is rather less than that between each and the hind lateral on its side; while the interval between those of the fore central pair is rather greater than that between each and the fore lateral on its side; the length of the front row is equal to that formed by any three eyes of the hinder row; and the four central eyes form a square whose fore side is shortest and its hinder side slightly the longest.

The *legs* are yellow, indistinctly annulated and marked with dusky brown, and furnished with long spines as well as with hairs and bristles.

The *palpi* are pale yellow, moderately long, and furnished with hairs, bristles, and a few spines.

The *falces* are vertical and strong; their colour is pale yellow, with a broad brownish band along the middle of their fore side, not reaching, however, to their extremities.

The *maxillæ* and *labium* are pale yellow.

The *sternum*, which is nearly round and pointed a little behind, is also of a pale yellow colour, but broadly margined on each side with dark blackish brown.

The *abdomen* has on the upperside a broad longitudinal dark brown band, as wide as the whole width of the abdomen at its fore extremity, but narrowing gradually to the spinners, near which its margins are a little denticulated; this band has the normal longitudinal macula along the middle of its fore part indistinctly defined, of a brownish-yellow colour, and pointed at its hinder extremity; and along either side of this are two or three more or less distinct dull whitish spots; the central tapering band is well defined on each side by a broad yellowish white marginal band; the sides are marked more or less with black-brown streaks and spots; and the underside is dull black-brown, divided by a longitudinal central yellowish bar (which tapers to a point behind), and margined by a bar on each side of a similar colour; the spinners are short and strong, those of the inferior pair being rather stronger, but equal in length to the superiors.

Four immature examples of this Spider were found on rushes in a marsh near Alexandria, and are of very great interest as forming a transition from *Dolomedes* to *Ctenus* and yet wanting such decided characters as would include them in either of those genera. The position of the eyes is very like that of *Sparassus*; and this, with the strongly laterigrade legs, shows an affinity to the Thomisides; but from the Spiders of this family they are separated by the presence of three instead of two tarsal claws. The general appearance, from the colours and markings, is exceedingly like that of *Dolomedes fimbriatus* (C. Koch); but the position of the eyes distinguishes it at a glance from that well-known species. The approximation to *Ctenus* is seen in the approach of the fore lateral eyes to the hind lateral ones; by which the front row is strongly curved instead of being straight or nearly straight as in *Dolomedes*; from this last genus the near approach together of the two rows also very plainly distinguishes it. From all these, and other considerations as well, it has appeared to me necessary to constitute a new genus for its reception.

Gen. PIRATA, Sund.

PIRATA LEOPARDUS.

Pirata leopardus, Sund.
Lycosa cambrica, Bl. Brit. & Irish Spid. p. 32, pl. ii. fig. 14.

Adults of both sexes were found in a marsh near Alexandria; and I can find no structural difference in the male palpi from those parts of *L. cambrica*, Bl. The colours, however, of the abdomen are more distinct and more strongly contrasted, while their disposition is the same.

PIRATA PROXIMA, sp. n.

Adult female, length 4 lines.

The *cephalothorax*, looked at in profile, has the thoracic region considerably humped, and the hinder slope very steep and abrupt; it is clothed with hairs, and the upper part, especially of the caput, is furnished with numerous erect blackish bristles; the colour is yellow-brown, margined with a black line, immediately above which is a narrow band clothed densely with short white hairs, a little way above which, again, is a broader but not very regular or continuous yellowish band: from the posterior eyes a broad yellowish tapering band runs to the hinder extremity, having within it a largish yellow-brown marking, fining off into the red-brown line which denotes the thoracic junction; this yellow-brown marking is again divided longitudinally by a yellowish line, which also runs through the middle of the ocular area.

The *eyes* occupy an area rather broader than long, the length being measured from the lateral eyes of the front to those of the hinder row, ignoring the upper angle of the caput, just below which the eyes of the middle row are placed; the length of the front row is equal to that of the middle one, and its two central eyes are a little further from each other than each is from the lateral eye next to it, and are smaller than the eyes of the hinder row, the fore laterals being the smallest of the eight.

The *legs* are strong, but not very long; their relative length appears to be 4, 1, 3, 2, though the difference between those of the first and third pairs is very small, if any; they are of a dull brownish-yellow colour (the femora only having the faintest traces of darker annulations on their uppersides), and are furnished with hairs, bristles, and spines; the latter are the strongest and most numerous on the tibiæ and metatarsi of the third and fourth pairs.

The *falces* are strong, and of a dark reddish yellow-brown colour.

The *maxillæ* are yellow-brown, tinged with reddish; the *labium* dark blackish brown, with a pale apex; and the *sternum* yellow, marked with a few not very distinct dusky brown blotches. All these parts are of normal form and furnished with bristly hairs.

The *abdomen* fits well up to the hinder slope of the cephalothorax; it is of a dull yellow olive-brown colour, paler on the under than on the upperside; the normal macula along the middle of the fore part of the upperside is indistinctly visible and of a dusky brownish hue, angular on each side near the middle and blunt-pointed at its hinder extremity; on either side of this macula, but free from its margins, are two dark spots in a longitudinal line, furnished with bluish-white hairs, the four spots forming nearly a square; four or five other similar spots on each side form two longitudinal lines on the hinder half of the abdomen, the lines converging towards the spinners; these spots are connected into pairs by very faint dusky angular transverse lines, or chevrons, the apex of that which joins the first two spots touching the hinder extremity of the normal macula on the fore part; the sides are mottled with small irregular patches and spots of short bluish-white hairs. A series of examples would probably show some variety in the distinctness of the pattern on the abdomen.

A single example only was found in a swamp near Alexandria. It is very nearly allied to *Pirata piratica*, C. Koch, as well as to *P. piscatoria*, C. Koch, and *P. hygrophila*, Thor. From the first of these the larger size of the spider, as well as the dark colour of the normal macula on the abdomen, will distinguish it at a glance; from the second, which is of about the same size, the much narrower white marginal border of the cephalothorax, as well as the lateral yellow bands, will, among other differences, serve to distinguish it easily; while from the third species it is at once separated by its greater size and immaculate (or almost immaculate) legs. It is probably an abundant Spider in the marsh referred to and in others near it; but I was unfortunately unable to pay this locality another visit after the discovery of the single example now described.

Gen. TROCHOSA, Koch.

TROCHOSA PARTITA, sp. n.

Adult female, length 5 lines.

The *cephalothorax* of this handsome Spider is rather drawn out, though not suddenly constricted laterally at the caput; it is of a yellow-brown colour, margined with a black line and a tolerably regular though not unbroken yellow band; the middle of the upperside has a somewhat star-shaped marking, formed by short yellow stripes converging to the thoracic junction; there are also other yellow patches of different sizes on the caput behind the ocular area, which is strongly suffused with black-brown, leaving, however, a clearish yellow space between the eyes of the hinder row.

The *eyes* are in the usual position, the ocular area being about equal in its length and breadth; the fore centrals are nearly, if not quite, as large as the eyes of the hinder row; the front row is longer than the middle one, and its eyes are separated by as nearly as possible equal intervals.

The *legs* are moderate in length and strength, their relative length being, as nearly as I could ascertain, 4, 1, 2, 3; their colour is yellow, faintly annulated and marked with dusky brown, and furnished with hairs and spines.

The *falces* are of a yellowish colour, clouded with yellow-brown towards their extremities; the *maxillæ* are yellow, and the *labium* dark yellow-brown, pale at the apex. The *sternum* is yellow, divided longitudinally by a well-defined and very distinct nearly black stripe.

The *abdomen* is of an elongate oval form, and clothed with dull yellowish hairs; the normal maculæ on the fore part, as well as the ordinary angular bars, or chevrons, on the hinder part (which last are spotted with small black points), are well defined, and vary in colour from yellow to reddish yellow-brown; besides which there are various lines and spots of yellowish and white, the ground-colour being nearly black, and the whole forming an exceedingly pretty and variegated pattern; the sides are yellowish, marked with short blackish spots and streaks; and the underside is also yellow, marked with three broken blackish lines.

An immature male and two adult females were found near Alexandria. It may be distinguished from all other European and Egyptian Spiders known to me by the yellow sternum bisected by a longitudinal black stripe.

TROCHOSA DEPUNCTA, sp. n.

Adult male, length 3½ lines.

This spider is very closely allied to *T. picta*, Hahn, but may be distinguished by its less distinct pattern and paler colours; the structure also of the palpal organs is different. The whole of the underside also, except the sternum, is of a pale yellow colour without any markings, the sternum being blackish brown, with a yellow longitudinal line dividing the fore half; while the underside of *T. picta* is invariably (in my experience) of a sooty black hue, and the annulation of the legs very strong and distinct. Possibly this Spider may be the *Lycosa nilotica* of Savigny; but as there appears to be considerable doubt upon the point, I have thought it best to give it here as a distinct species.

An adult male and two females were found near Alexandria.

TROCHOSA PILIPES.

Lycosa pilipes, Luc. Expl. en Algérie, p. 109, pl. ii. fig. 8.

Numerous examples of both sexes of this Spider were found under stones on the damp sandy flats bordering the Nile in Upper Egypt; and I believe them to be identical with the Spider described and figured by H. Lucas (*loc. cit.*). It is very closely allied to examples of *Trochosa lynx*, Koch, received from Dr. L. Koch, but is, I think, decidedly of a different species. The numerous long erect bristles and hairs on the legs (and, in fact, on the whole Spider) are very characteristic.

TROCHOSA VIRULENTA, sp. n.

Adult male, length 6 lines; adult female, 7 lines.

This Spider is nearly allied both to *T. pilipes*, Luc., and *T. lynx*, Koch, but may be distinguished by its larger size and bolder though very similar pattern on the abdomen. The palpi also of the male differ very perceptibly in their greater strength, their shorter cubital and radial joints, and the larger size (especially the greater width) of the digital joint; and the palpal organs are different in their structure. The legs also are far less distinctly annulated, and are quite destitute of the long erect hairs so conspicuous in *T. pilipes*.

Two adult males and an adult female were found in the neighbourhood of Cairo.

TROCHOSA URBANA, sp. n. (Pl. LX. fig. 14.)

Lycosa agretyca, Savigny, Egypte, p. 147, pl. iv. fig. 6.

This Spider, although nearly allied to *Trochosa* (*Lycosa*) *agretyca* (Walck. & Blackw.), is quite distinct from that species, and is in fact still more nearly allied to *L. campestris* (W. & B.). From the former the distinctly marked bright yellow colour of the normal macula on the fore half of the abdomen, as well as its pointed hinder extremity, will distinguish it at a glance; while from the latter, with which it agrees in size, and which it resembles greatly in appearance, it may easily be separated by the character of the central longitudinal yellow band on the cephalothorax. This in *T. campestris* is broad, tapering towards its hinder extremity, strongly constricted at the hinder part of the caput, and its fore part marked with two longitudinal parallel brown lines; whereas in *T. urbana* the central band is narrow and of uniform width from the hinder slope to the middle of the ocular area, having a pale yellowish longitudinal line on each side of its fore part near the eyes. Also, in all the examples found, the digital joint of the male is pale-coloured instead of being of a deep reddish brown as in *L. campestris*. The palpal organs of the male also differ in structure.

Adult and immature examples of both sexes were not infrequent among low plants and other herbage in a marsh near Alexandria.

TROCHOSA EFFERA.

Lycosa effera, Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 318.

An adult male and female were found in the neighbourhood of Cairo, differing from the Palestine specimens only in size, the Egyptian examples being the largest. The adult male measures 5½ lines in length, and the female 7 lines. An immature female was also found near Alexandria.

Gen. TARENTULA, Sund.

TARENTULA TARENTULINA.

Lycosa tarentulina, Savigny, Egypte, p. 143, pl. iv. fig. 2.

Immature examples (of the female only) were found in abundance near Alexandria, in their cylindrical holes on waste and desert places; the hoary-grey ground colour, and the black underside of the abdomen distinguish this Spider from all others of the family found by myself in Egypt.

TARENTULA TRUCULENTA, sp. n.

Female immature, length rather over 5 lines.

This Spider is very nearly allied in colours and general appearance to *Trochosa effera*, Cambr.; it may, however, be distinguished by the first row of eyes being distinctly shorter than the second, and by the marking of the falces, which in the present species are yellow, or orange-yellow-brown, with a longitudinal, well-defined, dark reddish-brown band, which runs in front from their base to their extremity, and appears to continue the broad dark brown bands running throughout the length of the cephalothorax and including on each side the lateral eyes of all the three rows. The rest of the cephalothorax is yellow; the central yellow band is abruptly constricted at the hinder part of the caput, whence it narrows gradually to the hinder extremity of the thorax. On the caput this band has two longitudinal parallel brown lines, which are often imperfect, and sometimes obsolete.

The *eyes* of the front row are very small (the centrals not very much larger than the laterals), and separated by as nearly as possible equal intervals; the laterals of this row are seated on strong tubercles, and have a rather downward direction; the height of the clypeus equals a diameter of the central eyes; the ocular area is not much longer than broad; and the length of the hinder row does not very much exceed that of the middle row.

The *legs* are yellow, immaculate, excepting in some few examples where the femora show a very faint trace of dusky annulations.

The *maxillæ* and *labium* are yellow, the latter clouded with brown towards and at its base; the *sternum* also is yellow, with two or three indistinct dusky longitudinal markings.

The *abdomen* is of a rather elongate oval form, its colour varies from yellow to pale yellow-brown; and the ordinary Lycosid markings are more or less distinctly traced by blackish brown broken lines and spots, the spots extending in broken oblique lines over the sides; the abdominal pattern in this, as in almost all other species of the family, is often greatly obscured by the hairs with which it is covered; immersion in fluid, however, brings out the pattern distinctly.

Eight or nine examples were found near Alexandria.

TARENTULA TREMENS, sp. n.

Adult female, length scarcely 4 lines.

Cephalothorax dull orange-yellow, clothed with yellowish grey adpressed hairs; a broad brown longitudinal band occupies each side, leaving a narrower yellow marginal one and a much broader central one; the latter is sharply dentated on its inner margins at the hinder part of the caput, the foremost denticulation representing the ordinary constriction, where the lateral dark bands break in upon the central pale one; this in the present Spider is almost of uniform width from the eyes to the beginning of the hinder slope, which is not excessively steep, forming an angle of about 45°.

The *eyes* of the front row form a line perceptibly shorter than those of the second row; the centrals of the second row are a little larger than the laterals, and the interval between them is rather greater than that between each and and the lateral eye nearest to it; those of the second (or middle) row are very large, and separated from each other by scarcely a diameter's interval; and yet the line formed by them is but a trifle less than that formed by the hinder row. The ocular area is longer than broad.

The *legs* are rather short and strong; their relative length apparently 4, 3, 1, 2; they are of a bright yellow colour, tinged with reddish brown towards the extremities of the first two pairs, and almost immaculate, the traces of annulation being scarcely perceptible; they are furnished sparingly with hairs and bristles, and a few rather short spines.

The *falces* are strong and of a rich deep red-brown colour, clothed sparingly with yellowish hairs and dark bristles.

The *maxillæ* are darkish yellow-brown, tinged with red, the extremities being pale yellow.

The *labium* is wholly dark red-brown, and the *sternum* yellow.

The *abdomen* is of a dull orange-yellow (paler underneath), and pretty thickly clothed with coarsish yellow-grey adpressed hairs, among which are a few prominent blackish bristles. The ordinary Lycosid markings are scarcely traceable, being only just indicated by a few minute black-brown spots. The sexual orifice is large but of simple form, consisting of two rather oblique oval apertures near together, but in opposition, at the hinder part of a large, nearly circular, red-yellow, somewhat corneous-looking convexity.

A single example of this very distinct Spider was found near Alexandria.

Gen. LYCOSA, Latr.

LYCOSA UNGULATA, sp. n.

Immature female, length 5 lines.

This Spider is certainly very closely allied to *Lycosa arenaria*, Sav. (resembling it in the remarkably long and slightly curved superior tarsal claws, by which it may be easily distinguished from all others known to me); the description, however, given of the colours and markings lead me to conclude that it is of a different species.

The *cephalothorax*, when seen in profile, is rather depressed behind the occiput; and the height of the clypeus considerably exceeds the diameter of the fore central eyes; this part and the ocular area are dark brown; but being, with the rest of the cephalothorax, covered with yellow-grey pubescence, its colour is not so apparent; there are also on these parts numerous long bristly hairs; the rest of the cephalothorax is of a bright straw-yellow colour, with two broad longitudinal yellow-brown bands, each of which includes at its fore extremity the lateral eyes, on its side, of the hinder and middle rows. The central yellow band is very broad, but strongly constricted (or indented) at the occiput, forming a pretty regular, large, transverse oval behind the posterior eyes; and behind this constriction the margins of the band are somewhat denticulate, and emit some pale divergent lines across the two yellow-brown bands, following the directions of the thoracic indentations; the thoracic junction is indicated by a longish red-brown indented line.

The *eyes* are in the usual position; those of the posterior and middle rows form nearly a square, the fore side shortest and the hinder side longest. These four eyes are very large, the posterior ones being rather less than the anteriors; the two centrals of the front row are larger than the laterals, and further from each other than from the lateral nearest to it, the row itself being shorter than the middle row.

The *legs* are long and moderately strong; their relative length apparently 4, 3, 1, 2, those of the fourth pair greatly exceeding the rest; they are of a straw-yellow colour; the femora are marked on their outer sides with a broken longitudinal stripe, and faintly annulated with pale yellow-brown; they are furnished with hairs and numerous pale, but not very long nor strong spines; and each tarsus terminates with three pale claws, of which the superior pair are very long and slightly curved, their hinder part finely pectinated; the inferior claw is exceedingly short, and bent almost perpendicularly downwards; the extremities of the tarsi* (which are subdivided, giving the legs eight joints instead of seven) are also furnished all round with longish slender spines.

The *palpi* are of moderate length; their colour is yellow, and the terminal claw long, slightly curved, and minutely pectinated.

The *falces* are moderately long and strong; they are of a yellow-brown colour, with a dark brown longitudinal band in front, nearly as wide as the falces, and they are furnished in front with numerous hairs and long bristles.

The *maxillæ* and *labium* are of a dull brownish hue, tipped with pale yellow.

The *sternum* is nearly circular, and of a uniform pale straw-yellow colour.

The *abdomen* is of a yellow colour, rather darker on the sides, spotted and marked with brownish black, and also with some spots, lines, and patches of white pubescent hairs; these latter give the Spider a remarkable appearance, the darker markings being much obscured by the general yellowish hairy clothing; when examined closely, however, and especially when in spirit of wine, the usual characteristic markings become apparent enough. The normal longitudinal macula on the fore half of the upperside is of a yellowish brown hue, pointed behind, and with some black marginal spots; and the transverse chevrons are formed by more or less perfect blackish lines; the sides are spotted and marked with blackish.

Three immature females of this Spider were found at the roots of stunted herbage on the desert near Jebel y Silsilis, in Upper Egypt.

LYCOSA FIDELIS.

Lycosa fidelis, Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 319.

Lycosa galerita, L. Koch, Ægypt. u. Abyss. Arachn. 1875, p. 69, Taf. vii. fig. 1.

The peculiar structure of the palpal organs of the male of this Spider, well represented in Dr. Koch's figure (*loc. cit. supra*), with some other striking characters, render its identity with *L. galerita*,

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* The subdivision of the tarsi of this and another allied Sinaitic species (*L. prælongipes*, Cambr.) will probably necessitate the formation of a new genus for their reception.

L. K., pretty certain. Adults of both sexes were frequent both in the neighbourhood of Cairo and Alexandria.

LYCOSA INJUCUNDA, sp. n. (Plate LX. fig. 15.)

Adult male, length rather over 3 lines.

This Spider is very closely allied to *L. fidelis*, Cambr., and is found in the same localities; it may, however, be at once distinguished by the generally duller and less distinct colours and markings in both sexes, especially in the adult males, whose cephalothorax has distinct, though irregularly edged and slightly interrupted, lateral yellow bands, leaving a broken marginal brown band on each side; the central longitudinal yellow band is also quite distinct, strongly radiated at the thoracic junction, and much constricted at the occiput, whereas in *L. fidelis* the central band is scarcely traceable and the lateral ones quite obsolete.

The *eyes* of the hinder row are further apart than in *L. fidelis*; in other respects, except being generally larger, the eyes are very similar in both species.

The *legs* are dull yellow, annulated with brown, but not nearly so distinctly as in *L. fidelis*.

The *palpi* of the adult male differ remarkably in the two species, those of *L. fidelis* having the humeral and digital joints black, and the cubital and radial joints clear yellow, the fore part of the latter, as also the base of the digital joints, clothed with white hairs; the cubital and radial joints are also rather short, and of equal length; while in the present Spider the humeral joint is dull yellow, like the cubital and radial, these two latter being longer and differing in their relative length, the radial being distinctly longer than the cubital, and (as well as the digital, which is of a dark brown colour, and terminates with two strong curved claws) entirely destitute of the white hairs which in *L. fidelis* form so striking a contrast to the black digital joint. The palpal organs of the present species are also of much less complex structure than those of *L. fidelis*: no description would avail to make their structure intelligible; this can only be done by good figures on a large scale; one character, however, of those of the present Spider is unusual, if not unique—the large basal corneous lobe or process being clothed with hairs.

The underside of *L. fidelis* is much darker than in the present Spider; this is especially noticeable in the sternum, which in the former is deep brownish black, and in the latter pale dull yellowish, with sometimes two longitudinal dusky brownish curved stripes.

Adult and immature examples of each sex were found both near Cairo and Alexandria. The females of the present Spider may be distinguished from those of *L. fidelis* by the much smaller and differently formed genital aperture.

LYCOSA INIQUA, sp. n.

Adult female, length nearly 4 lines.

This Spider bears considerable general resemblance to *L. injucunda*, but may be separated at a glance by the large size of the eyes of the middle row; these are more than double the size of those of the hinder row, and form very nearly as long a line as the latter. The sides of the cephalothorax are rather depressed; a broad, longitudinal, brownish yellow band, radiating at the thoracic junction, occupies the middle; and the lateral margins have a broken band of the same colour, the intermediate spaces forming two broad brown bands; the ocular area is black-brown; and the whole has a dense clothing of yellowish grey pubescence.

The *legs* are rather short, though not very unequal in length, their relative length being apparently 4, 3, 1, 2; they are yellow, the femora banded with black-brown, and the femoral and base of the tibial joints slightly marked with a similar colour.

The *falces* are brownish yellow, blackish near their base in front, and marked obliquely towards the extremities with a dusky brown band.

The *sternum* is black-brown, with a broad, irregularly edged, yellow, longitudinal central band, which does not, however, reach the hinder extremity.

The *abdomen* is dull blackish brown above, all the normal characteristic markings being much obscured; the normal central marking on the fore part is bifid at its hinder extremity, and has an angular point, directed backwards, near the middle of each side; the hinder part has two nearly parallel longitudinal rows, each of three or four rather conspicuous pale spots, furnished with whitish hairs; and between them is an indistinct series of yellowish angular bars or chevrons; the sides are marked with black-brown spots and broken lines, which are more thinly dispersed towards the underside, which is yellow, margined with black-brown, and divided by a longitudinal central dark brown bar.

A single example was found under a stone near Alexandria.

LYCOSA INQUIETA, sp. n.

Adult male, length 2 lines.

Cephalothorax, deep brown, with a broad, longitudinal, central brownish yellow band, tapering slightly from the eyes to the hinder extremity, and, together with the space included by the four large posterior eyes, covered thickly with yellowish grey hairs; there is also on each side a narrow yellowish lateral stripe, interrupted near the middle, and situated a little way above the margin; the *clypeus* is brownish yellow.

The *eyes* of the middle row do not appear to be larger than those of the hinder one; but the line formed by them is shorter than that formed by the latter, and also a little shorter than that formed by the laterals (on each side) of these two rows; the centrals of the front row are larger than the laterals, and are much further apart from each other than each is from the lateral eye on its side.

The *legs* are long, and tolerably strong; their colour is dull yellowish, faintly annulated with dusky brown.

The *palpi* are also dull yellowish in colour, the digital joint being brown; the radial joint is rather larger and stronger than the cubital, and (together with the digital) pretty densely clothed with black bristly hairs; the palpal organs have a strong, pointed process at their fore part, the point directed forwards and outwards; between the base of this process and the outer margin of the digital joint is a small bluntish corneous, black-tipped point; and near the middle of the large basal lobe is a small prominent blunt-pointed process, with another of equal length springing at right angles from its base; on the outer side the digital joint has no terminal claw.

The *falces* are dull yellowish, suffused with dusky brown.

The *maxillæ* and *labium* are pale yellow, and the *sternum* black-brown.

The *abdomen* is broader behind than before; it has all the characteristic markings on the upperside indicated by black lines and spots on a reddish yellow ground; the normal marking on the fore half is rather blunt-pointed behind, and broadest near the middle, whence on either side an oblique black line issues; the sides are dull yellow, marked with short black lines and spots, some of which are disposed in oblique rows; the underside is pale yellow.

A single example of this small but very distinct species was found near Alexandria; in its colours and pattern it is very like *Tarantula miniata*, Koch, but is much smaller.

LYCOSA INOPINA, sp. n. (Plate LX. fig. 16.)

Lycosa proxima, Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 316 (nec *L. proxima*, Koch).

A careful comparison assures me of the identity of the Spider quoted in the above synonym with the species now recorded; and I have now but little doubt that it is distinct from *L. proxima*, Koch, though nearly allied to it; the certainty, however, of this can only be ascertained by comparison of typical examples of both species; meanwhile it seems best to describe the present species as a distinct one.

The length of the adult male is a little over 2 lines; and it belongs to the *monticola* group. The central yellow longitudinal band on the cephalothorax is not very broad; it is widest at the thoracic junction, comes abruptly to a point (sometimes obsolete) immediately behind the ocular area, and tapers to a point at its posterior extremity; the lateral yellow bands are well defined, but irregular on the edges, and interrupted, leaving also a distinct brown marginal stripe; the intermediate spaces form two broad dark yellow-brown bands marked pretty distinctly with converging black lines; these bands are of a bright orange (and sometimes lemon) yellow colour; the ocular area is black.

The *eyes* differ little, if any thing, in size and position from those of *L. inquieta*, Cambr.

The *legs* are long and moderately strong; they are yellow, slightly marked and faintly annulated with dusky brown. Some have scarcely any markings or annulation visible.

The *palpi* are black; the radial and digital joints clothed densely with hairs; the palpal organs are rather simple, the chief characteristic prominent process near the centre is short, stout, obtusely pointed, and with a slightly pointed spur at its base nearly as long as the process itself, with which it forms by its direction a very obtuse angle.

Falces black-brown, but in some examples (probably those more recently come to maturity) yellow, merely clouded with dusky brown.

Sternum dusky brown to black, with a short yellow central stripe or marking.

Maxillæ and *labium* yellowish dusky brown to black, with the extremity of a clearer hue.

Abdomen black, or nearly so above, with the normal markings on the fore half of the upperside broad and somewhat angular in the middle, fining to a point behind, and of a bright orange or lemon-yellow; this is followed to the spinners by a series of strong but short angular bars, or chevrons, generally confluent, decreasing in size as they go backwards, and marked with a few distinct black points or spots; the sides are yellow, more or less clouded with black; and the underside is black, margined on each side with a straight yellowish line. Individuals are frequently found altogether of a lighter hue, and with the underside of the abdomen clear yellow; but the pattern above described on the upperside may be easily traced, being defined by black spots and markings on a yellow ground; in these examples the palpi are also yellow, the radial and digital joints alone deepening to dusky black.

The females generally resemble the males; but the central cephalothoracic band is often dilated behind the ocular area, and constricted at the occiput, the anterior dilatation being more or less extensively marked with yellow brown; the normal macula and succeeding chevrons on the abdomen also often form a broad dentate yellow band narrowing to the spinners; and marked with a series of pairs of black points or spots; in this sex the legs also are far more strongly and distinctly annulated with brown.

Adults of both sexes were common near Alexandria.

LYCOSA OBSERVANS, sp. n.

The adult male of this Spider is 2 lines in length.

It is very closely allied indeed to *L. inopina*, and is found in the same locality and situation; but it is rather smaller, and its colours are in general far less distinct, and run more one into the other, the pattern formed by their distribution being similar; the cephalothorax has no lateral yellow bands visible in either sex; and the posterior half (sometimes more) of the femora of the first pair of legs is black, the corresponding part of the second pair being also suffused with the same hue. The palpi are black, the radial and digital joints densely clothed with hairs; the palpal organs are somewhat similar; but the characteristic process is far less strong, its basal spur being of equal length with the process itself, obtuse, and forming with the process a more acute angle than in *L. inopina*.

It is possible that this Spider may be the *L. proxima*, Koch, though I am inclined to think it is of a distinct species. In some adult male examples the legs are entirely yellow, without any dark markings or annulations whatever; in general, however, they are more or less distinctly annulated with dusky brown or brown-black, especially in the females.

Adults of both sexes were found near Alexandria.

Fam. SPHASIDES.

Gen. OXYOPES, Latr.

OXYOPES ALEXANDRINUS.

Sphasus alexandrinus, Sav. et Aud. Egypte, p. 142, pl. iv. fig. 1.

Adult and immature examples of each sex were found near Cairo on branches of the sont acacia.

OXYOPES BILINEATUS, sp. n.

Length of an immature female, 2 lines.

Several very young examples of this species were found near Cairo, in a similar situation to that in which the last species was found. I feel no doubt that it is a distinct and probably undescribed species, though in the immature condition this is not absolutely certain, Spiders varying sometimes very considerably in the young state.

In general form and position of the eyes the present Spider is very similar to *O. alexandrinus*. The *abdomen* is of a yellow-brown colour, marked on the upperside with two very nearly parallel longitudinal pale yellowish lines rather wide apart, and comprising a broad brown elongate-oval band running the whole length of the abdomen. The sides are entirely devoid of the oblique pale lines so characteristic in *O. alexandrinus*; nor are there any angular lines, or chevrons, on the hinder half of the upperside of the abdomen.

The *cephalothorax* is yellow, with three broad longitudinal brown bands.

Fam. SALTICIDES.

In recording and describing the species of this family found by myself in Egypt, I have not attempted to place them in any systematic consecutive order: the known species are placed first; and they are followed in each genus by the species considered to be new to science. Few families of the Araneidea need a thorough revision so much as the Salticides, especially with respect to the exotic genera. The number of described species of the family is now so great (upwards of one thousand) that their certain subdivision into well marked genera becomes each year a more pressing necessity. M. Eugène Simon has worked hard and successfully at the European forms of this family; and I am mainly indebted to him for the determination of those found in Egypt.

Gen. BALLUS, Thor.

BALLUS PIGER, sp. n.

Adult female, length 2 lines.

This Spider is very nearly allied to *Ballus heterophthalmus*, Koch (*Marpissa brevipes*, Koch, *Salticus obscurus*, Bl.), which it closely resembles in form, size, colour, and markings; and it may be distinguished by the legs of the first pair being like the rest, but slightly striped with brown; whereas in *B. obscurus*, they are almost wholly (at least the femoral, genual, and tibial joints) deep chocolate-brown; the humeral and cubital joints also of the palpi are of the same hue, whereas in the present Spider the palpi have scarcely any dark markings. Although these differences appear at first sight but slight ones by which to distinguish the species, I feel convinced that they will be found to be constant; I have examined numerous examples of the European form, and find no variation whatever in the markings of the legs and palpi; and I should be confident that some day the adult male and other examples of the female will further prove their distinctness from *S. obscurus*.

A single example only of the adult female was found in Upper Egypt.

Gen. ATTUS, Sim. (*Salticus*, Latr. ad partem).

ATTUS DELECTUS. (Plate LX. fig. 88.)

Attus delectus, Cambr. Spid. Pal. & Syr., P. Z. S. 1872, p. 326.

Adults of both sexes of this pretty and distinctly marked Spider were found near Alexandria.

ATTUS MOUFFETTII.

Salticus mouffettii, Sav. et Aud. Egypte, p. 171, pl. vii. fig. 17.

An adult female of this well marked Spider was found near Alexandria.

ATTUS STAINTONII.

Salticus staintonii, Cambr. Spid. Pal. & Syr., P. Z. S. 1872, p. 331, pl. xiv. fig. 20.

Salticus congener, Cambr. loc. cit. p. 332.

Adults of both sexes of this exceedingly distinct Spider were found in Upper Egypt, and are undoubtedly identical with those described *l. c. supra*. I have, moreover, now no hesitation in determining *S. congener* (*l. c. supra*) to be the female of *S.* (*Attus*) *staintonii*, although differing from it so considerably in colour and markings.

ATTUS SPINIGER. (Plate LX. fig. 103.)

Salticus spiniger, Cambr. Spid. Pal. & Syr., P. Z. S. 1872, p. 339.

Both sexes, adult as well as immature, were found on the trunks of palm-trees at various places in Egypt, between Cairo and Assouan. The very long, circularly coiled, filiform spine, connected with the palpal organs of the male, forms a very striking and distinguishing character, and renders the present Spider an easy one to be determined.

ATTUS PAYKULLII.

Salticus paykullii, Sav. et Aud. Egypte, p. 172, pl. vii. fig. 22.

S. vaillantii, Luc. Explor. de l'Algér. Arachn. p. 136, pl. v. fig. 2.

The identity of the two Spiders mentioned in the above synonyms appears to be undoubted. Adult and immature examples of both sexes were found near Cairo and Alexandria, generally on old walls. I have received lately adults of both sexes from the Mauritius, from Edward Newton, Esq., and also from Bombay, from Major Julian Hobson (H.M. Staff Corps).

ATTUS SOLDANII.

Salticus soldanii, Sav. et Aud. Egypte, p. 181, pl. vii. fig. 17, 18.

An adult male and several female and immature adults were found near Alexandria.

ATTUS MONARDI.

Salticus monardi, Luc. Explor. de l'Algér. p. 156, pl. vii. fig. 1.

An adult male of this distinct and pretty species was found near Cairo.

ATTUS FULGENS.

Salticus fulgens, Cambr. Spid. Pal. & Syr., P. Z. S. 1872, p. 340, pl. xiv. fig. 17.

Adults of both sexes were not unfrequent on trees and plants, near Alexandria, Cairo, and in Upper Egypt. This is one of the most brilliant and pretty of all the Salticides I found in Egypt; and its golden green iridescent abdomen distinctly spotted with white renders it an easily determined species.

ATTUS REGILLUS. (Plate LX. fig. 17.)

Attus regillus, L. Koch, Verhand. zool.-bot. Ges. Wien, p. 879.

Adult and immature males with immature females were found near Cairo and in Upper Egypt on trees and low shrubs, and subsequently in similar situations near Smyrna and Ephesus. I have also received it from Bombay. I include this Spider in the genus *Attus* on M. Simon's authority; but I conceive that the peculiar, almost circular form of the cephalothorax entitles it to generic separation from the typical *Atti*. A similar form of cephalothorax is not unfrequent in several other (as yet undescribed) exotic species.

ATTUS BONNETII.

Attus bonnetii, Sav. et Aud. Egypte, pl. vii. fig. 14 (♀).

Attus canescens, Cambr. Spid. Palest. & Syr., P. Z. S. 1872, p. 323.

Adults of both sexes of this species were found near Alexandria, and also at the roots and among the stems of stunted plants on the desert near Jebel y Silsilis, in Upper Egypt.

Savigny and Audouin describe and figure only the female; the male (length 2¼ lines) differs in the abdomen wanting the double longitudinal nearly parallel series of short oblique pale streaks on the upperside; instead of these there is a broad longitudinal central dark blackish-brown band, which sometimes emits a few very short oblique streaks on each side near its hinder extremity. The rest of the upper part and sides are thickly clothed with greyish hairs; though occasionally the sides have a broad longitudinal rusty or brownish band, marked with one or more indistinct oblique pale lines.

The *clypeus* of the male is, in general, densely clothed with white hairs, though in some examples these hairs are rusty red; the lateral margins also of the cephalothorax have a broad band of white hairs; and the upperside has two indistinct longitudinal bands of a similar nature.

The *legs* are sometimes yellow, without any markings; but in some specimens they are faintly annulated and marked with brown.

The *palpi* are short and similar to the legs in colour; the cubital and radial joints are very short; the latter is the shortest, and has, at the extremity of its outer side beneath, a strong slightly curved, prominent, tapering and sharp-pointed reddish-brown apophysis; from its position this apophysis is not easily seen without considerable care in examination; its length is equal to, if it does not exceed, the length of the joint. The palpi are clothed with long white bristly hairs; the digital joint is of good size, longer than the radial and cubital joints together; it is of a somewhat oblong-oval form, constricted on its outer side towards the fore extremity, where it has a somewhat truncated appearance. The palpal organs appear to be simple in form, and are of a dark reddish-brown colour.

This Spider is evidently subject to considerable variety in colours and distinctness of markings. A variety of the female, described in "Spid. Palest. & Syr." *l. c. supra* as *Salticus canescens*, Koch, has the longitudinal central band on the abdomen of a rusty red hue, but similar in its form and character to that of the male. An example of this variety, resembling exactly the Palestine specimen, was found along with the rest in Upper Egypt. Probably the variation in markings depends chiefly on the hairy clothing being more or less uninjured; when colours are dependent on pubescence, these will vary very much according to the length of time since the Spider became adult and has been exposed to the brilliant rays of the sun on a barren desert.

ATTUS OCULATUS, sp. n. (Plate LX. fig. 90.)

Adult male, length 2 lines.

The *cephalothorax* is massive, the hinder slope abrupt and slightly hollow in the profile line; the profile of the upper part of the caput forms a slightly curved line; and the fore part of the ocular region is rather prominent; its colour is yellow brown, the ocular area strongly tinged with orange, and the margins black; the surface is pretty thickly clothed with a depressed yellowish grey pubescence and whitish squamose hairs; the clypeus and the lateral margins (as well as the base of the falces in front) being more densely and regularly clothed with pure white hairs of the same nature.

The *eyes* are on black tuberculate spots, in the ordinary position;

the ocular area is broader than long, the line formed by the two posterior eyes being considerably longer than that formed by the four anterior ones; the fore centrals are of a dull mother-of-pearl colour, unusually large, but not quite contiguous to each other, and each is also very near but not quite contiguous to the lateral of the same row on its side. The minute eyes of the middle row are rather nearer to the posterior than to the anterior row, and each is placed within the straight line formed by the lateral eyes of those two rows respectively.

The *legs* are rather unequal in length; those of the first pair (in the male) are the longest and strongest; the femora, genua, and tibiæ of this pair are of a bright yellow-brown, the metatarsi considerably darker, and the tarsi pale yellow, the tibiæ and metatarsi being fringed above and below with strong prominent hairs; the legs of the third pair are, in the males, next in length (in the females they are rather longer than those of the first pair), those of the second pair being a little shorter than those of the fourth; these three pairs are yellow, slightly marked with dusky brown, but not regularly annulated; all are furnished with spines, those beneath the tibiæ and metatarsi of the first pair being the longest and strongest.

The *palpi* are short, and yellow in colour, the radial and digital joints bright yellow-brown; they are furnished thickly with hairs, chiefly white, and some of them, especially on the cubital, radial, and digital joints long and strong; the radial is rather shorter than the cubital, and has its extremity on the outer side produced into a very slightly curved, tolerably strong, tapering, deep-reddish-yellow-brown apophysis, almost, if not quite, equal in length to the joint itself; the digital joint is oval, and as long if not rather longer than the radial and cubital joints together; the palpal organs are well-developed, but simple in structure, with a strong curved tapering corneous process or spine lying along their inner side.

The *falces* are small, of a deep blackish red-brown colour, and clothed with white squamose hairs near their base in front.

The *maxillæ* and *labium* are similar to the falces in colour, tipped with pale yellowish.

The *sternum* is yellow, oval, and clothed with coarse whitish hairs.

The *abdomen* is small, oval, blunt behind, truncate before, and clothed pretty thickly with hairs; its colour is sandy yellowish, marked above and on the sides with dark brown, but forming no very definite pattern; the markings on the upperside are joined to the lateral ones, and form somewhat oblique but irregular lines; a central dark marking along the middle of the fore half of the upperside is also occasionally traceable; the spinners are moderately long and prominent.

The female is larger than the male, and is of a generally paler hue; the fore central eyes are also of a dull opaque whitish porcelain hue.

Two adults of each sex were found at the roots and among the stems of scattered herbage on the desert near Gebel-y-Silsilis, in

Upper Egypt. It is a very active spider, and appears to be nearly allied to the *Attus frontalis* (Walck.) of Europe.

ATTUS MENDICUS, sp. n.

Adult male, length 2½ lines; adult female, 4 lines.

The *cephalothorax* is of a deep brown-black colour, densely clothed with greyish and sandy-grey pubescence, and margined with long white hairs; the hairs on the ocular area are of a distinctly squamose character, and sometimes form alternate longitudinal stripes of a whitish and sandy brownish-red hue. The fore part of the ocular area is also furnished with a few long curved bristles and bristly hairs; and the clypeus equals in height the diameter of a fore central eye.

The *eyes* are in the usual position, and their colour is dull greenish mother-of-pearl; the ocular area is scarcely broader than long, but projects forward considerably, and the line formed by the two posterior eyes is equal to that formed by the four anterior ones; the lateral eyes of the anterior row are removed considerably backwards, so that, looked at from above and behind, the row is strongly curved, with the curve directed forwards; the interval between each lateral and the central eye nearest to it is very nearly, if not quite, equal to the diameter of the lateral; the minute eyes of the middle row are respectively halfway between the laterals of the posterior and anterior rows.

The *legs* are strong, moderately long, and of a yellowish colour, indistinctly annulated with brown, furnished with spines, and clothed with hair, chief among which is a more or less dense whitish pubescence; the tibiæ, tarsi, and metatarsi of the first pair are dark brown. The femora of the same pair are somewhat tumid on the outer sides, rather beneath the fore extremity, where they have also a conspicuous double fringe of dark bristly hairs; their relative length appears to be 4, 3, 1, 2; but the difference is not very great; beneath the terminal claws of each tarsus is a black scopula, or brush of hairs.

The *palpi* are yellow, thickly fringed above and on each side with long, curved, white, bristly hairs, among which are a few black bristles; the cubital and radial joints are very short, but of about equal length; and the latter does not appear to have any apophysis at its outer extremity. The digital joint is equal to the radial and cubital joints together, and of an oblong oval form, truncated at its fore extremity; it is of a deep brown colour, clothed with long whitish bristles and hairs. The palpal organs are very large, but of simple structure, and of a somewhat globularly oval form; they are nearly black in colour, and extend backwards and outwards beneath the radial joint.

The *falces* are small, directed backwards, and, from the prominence of the ocular area, placed far back beneath the fore part of the cephalothorax; they are of a dark yellow-brown colour, clothed with hairs.

The *abdomen* is of a broadish oval form, dark black-brown, but densely and uniformly clothed with whitish and sandy grey pubescence, liable to be rubbed off in capturing and securing.

The female is considerably larger than the male, but resembles it in general characters and appearance; the colour of the abdomen in this sex, however, is more commonly of a more sandy hue than that of the male.

Adults of both sexes were found on the bare desert in several places from Alexandria to Assouan, and, except when in motion, are exceedingly difficult to perceive. The males are very active.

ATTUS MENDAX, sp. n.

Adult male, length 3 lines.

The *cephalothorax* of this Spider is massive, but of ordinary form, and thickly pubescent, with a good many prominent bristly hairs scattered over its upper surface, but most thickly on the fore part of the ocular area. It is of a deep black-brown hue, and has two parallel longitudinal stripes clothed with white hairs; these stripes run to the eyes of the hinder row, and melt away insensibly into the somewhat greyish rusty-yellow colour of the ocular area; the black-brown band between them is rather more than double their width, but narrows a little at its hinder extremity: the margins of the cephalothorax are black; but there is a bordering of white hairs both above and below them.

The *eyes* are in the ordinary position; the ocular area is broader than long, and the length of the hinder row is less than that of the anterior one; the eyes of the intermediate row equally separate the posterior and anterior ones, and each is placed a little within the straight line formed by the laterals of these two rows on its side. The height of the clypeus equals the diameter of one of the fore central eyes; these are very near to each other, but not quite contiguous, and each is separated from the lateral eye of the same row on its side by no more than one third the diameter of the latter.

The *legs* are strong, but not very long, nor greatly different in length; relatively to each other they are 4, 3, 1, 2; their colour is a dull yellow, faintly marked with a dusky hue, but scarcely annulated; they are clothed with a little greyish pubescence, and furnished with spines, hairs, and bristles; each tarsus terminates with two rather long claws, pectinated, and with a strong and compact scopula beneath them.

The *palpi* are short and strong; they are of a pale yellowish colour, the digital joints being slightly brownish yellow; the cubital joints are thickly fringed and clothed above with strong white hairs, among which, on the fore margin of the upperside of the joint, is a strong, prominent, black, tapering bristle; the radial joint is shorter than the cubital, and has a small, dark-coloured, slightly curved, and (apparently) blunt-pointed apophysis at its extremity on the outer side, just, or nearly, behind which is a rather compact tuft of straight black bristles; there are also some other bristles (both black and white) on other parts of the joint; the digital joint is large, considerably longer than the radial and cubital joints together, of an oblong-oval form, somewhat obliquely truncated at its fore extremity, and clothed with whitish hairs; the palpal organs are simple but large, and project backwards and rather outwards beneath, but free from, the radial joint, terminating in a somewhat conical point.

The *falces* are small, straight, nearly vertical, and of a yellow-brown colour, furnished with hairs and bristles.

The *abdomen* is oval, pointed behind, hairy, and of tolerable size; the upperside is brownish black, with a strong longitudinal central white or pale sandy grey stripe; this stripe is well defined on its edges, but is slightly broadest behind, and a very little notched or irregular on the edges in that part; the sides are slightly marked with brown, as also is the underside; but usually all markings on these parts are obscured by the thick grey or light sandy-grey pubescence; the spinners are prominent, black, tipped with white.

Three adult males were found in the neighbourhood of Cairo. It is nearly allied to *Attus fasciatus*, Hahn, but (the male, at least, the female being yet unknown) may be distinguished by its stronger and more robust form, and the distinctness of the white stripes on the cephalothorax and abdomen. It is also nearly allied to a species* abundant in the neighbourhood of Jerusalem and Jericho, and recorded (Spid. Palest. and Syria, P. Z. S. 1872, p. 322) as *A. fasciatus*, Hahn, with which species M. Simon considered it to be identical.

Having more recently found undoubted examples, in the south of England, of the true *A. fasciatus*, Hahn, the Palestine examples are proved to be quite distinct, being not only very much larger, but differing decidedly in colours and in the structure of the palpi.

ATTUS EFFIGIES, sp. n.

Immature male, length 2$\frac{3}{4}$ lines.

Although almost denuded of hairs and pubescence, I am induced to describe this Spider as new to science, since it presents a very distinct pattern, and exhibits a strong likeness to a well-known European form *Yllenus*, *V.-insignitus*, Clk., from which, however, I think it is probably quite distinct.

The *cephalothorax* is dark yellow-brown, with two longitudinal yellow bands running backwards from each eye of the posterior row; these bands are partly clothed with white hairs, and probably are entirely and very distinctly so in uninjured specimens; the ocular area is dark brown, clothed with a greyish pubescence, showing some converging lines on its fore part, somewhat resembling those lines which form the Λ-shaped mark in *Yllenus V.-insignitus*,

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* To this Spider I now give the name of *Attus interceptor*. It may be distinguished from *A. mendax* (described above) by its larger size, and dark-brown sides, forming, in fact, three longitudinal grey stripes on the abdomen; the radial and hinder part of the digital joints of the palpi are also black-brown, offering a strong contrast to the white hairs with which the cubital joint is clothed; the legs, too, of the male differ in being dark red-brown and black, the tarsal joint yellow-brown, and the scopula of a sandy-greyish hue.

Clk.; the height of the clypeus equals, or nearly so, the diameter of one of the fore central eyes. The ocular area is broader than long; but the length of the posterior and anterior rows of eyes is equal; the eyes of the intermediate row are rather nearer to the posterior than to the anterior row.

The legs are short and strong; their relative length appears to be 4, 3, 1, 2; they are banded alternately, though not very distinctly, with yellow and yellow-brown; they are armed with spines (but most of the hairy clothing was absent); and each tarsus has a black scopula beneath the terminal claws.

The *palpi* (in an undeveloped state) are yellow, the digital joint being of large size.

The *abdomen* is black-brown on the upperside; a dark oblong marking along the centre of the fore half is followed to the spinners by a series of short, pale, angular bars, or chevrons, running one into the other and forming a dentated band; it is probable that this band is clothed with white hairs in uninjured examples; the sides are brown, marked with one or two oblique pale stripes; and the underside is pale luteous, spotted thinly with small black-brown spots, which concentrate and form an undefined band along the middle. The spinners are prominent, of a dark-brown colour, tipped with dull yellowish white.

A single example was found near Alexandria.

ATTUS MEMORIALIS, sp. n.

Adult female, length slightly over 2 lines.

The *cephalothorax* of this Spider is of ordinary form; in the two female examples found it was wholly (probably accidentally) denuded of hairy clothing; its colour is dark yellow-brown, with two longitudinal, pretty-well defined, dull orange-yellow stripes reaching from the hinder extremity (where they converge a little) to the ocular area, which is jet-black; the fore part of this area is prominent, and the clypeus (whose height is less than half the diameter of one of the fore central eyes) retreats; besides the two longitudinal stripes, there is a broad marginal one of the same hue on each side.

The *eyes* are in the usual position; the ocular area is broader than long, its posterior side being a very little shorter than the anterior; the eyes of the intermediate row are a little closer to the lateral eye of the posterior than to that of the anterior row on either side, but are in the same straight line with them; the eyes of the anterior row are bordered with white cilia; and probably the yellow stripes on the cephalothorax are usually clothed with white or grey or yellowish hairs, the remaining portions with dark brown ones; but, in the absence of an uninjured specimen, this is uncertain.

The *legs* are moderately strong, and not very long; their relative length appears to be 4, 1, 3, 2, the difference, if any, between those of the first and third pairs being very slight; the colour is yellow, without any markings or annulation: all the ordinary hairs and bristles were wanting (probably rubbed off by accident); but some strongish spines remained. The tarsal claws of the first and second pairs have a single small tooth near their middle part underneath; on the other legs the claws were absent, probably broken off by accident.

The *falces* are short, rather strong, directed backwards, and of a brownish orange-yellow colour.

The *abdomen* is oval; its colour is pale yellow, with two broad, brown, nearly parallel, longitudinal, well-defined bands down the centre of the upperside, and a less well-defined marginal stripe of the same colour on each side; taking the brown portions to be the ground-colour, there are thus three strong longitudinal yellowish stripes on the upperside—a straight one along the centre, and a curved one on each side; the underside has no markings, being of a uniform pale yellow; besides darker ones, the whole abdomen is thinly clothed with greyish hairs.

The adult male (length $1\frac{2}{3}$ line) resembles the female in colours and markings; the yellow stripes on the upperside of the cephalothorax are clothed with white hairs; and the ocular area has the remains of a yellowish-grey pubescence. The *palpi* are short, their colour is a dull brownish yellow, and they are furnished with white and black hairs and bristles; the cubital joint has a group of black bristles near its extremity on the inner side; the radial joint is rather shorter than the cubital, and furnished thickly with dark bristly hairs on the inner side; the whole of the outer side is a little produced, and apparently terminates with two small, blunt-pointed apophyses, forming a small fork-like extremity (the hinder apophysis being the least strong, and of a dark brown colour); the digital joint is large, of an oval form, considerably exceeding in length that of the radial and cubital joints together; its colour is yellow-brown, clothed with blackish bristly hairs, and tipped with grey ones; the palpal organs are large, and consist of a nearly globular pale brownish-yellow corneous bulb, which extends backwards beneath the radial joint. The tarsal claws of the fourth pair of legs are very slender, and have several fine pectinations near and beneath the fore extremity; I was unable to observe those of the first and second pairs; beneath the terminal claws in both sexes is a small dark scopula. The central yellow abdominal stripe in the male is much broader than the lateral ones, and has some very fine yellow points, issuing obliquely on each side, near its hinder extremity. These points represent the terminations of the ordinary angular bars, or chevrons, here obsolete.

An adult male, and two adult females were found in Upper Egypt. It is a very distinct species, though allied to *Attus lineatus*, Koch, and *A. bresnieri*, Luc.

ATTUS MEMORABILIS, sp. n. (Plate LX. fig. 110.)

Adult male length 3 to $4\frac{1}{4}$ lines.

Cephalothorax nearly double as long as broad, and of a flattened form; its colour is yellow-brown, and of a much deeper hue on the hinder slope than on the sides, with a black margin slightly fringed with white hairs; ocular area black, thinly furnished with fine shiny yellowish-grey hairs; the hinder part has several short oblique stripes of white hairs; and besides other hairs and slender bristles, there are one or two small tufts of stronger black bristles on either side of the ocular area just below the extremities of the anterior and intermediate rows of eyes, looking (when perfect) like horns; there is also a patch of white hairs close behind each eye of the posterior row; and one example also had a similar patch close behind the fore central eye. Clypeus almost obsolete.

The *eyes* are in the usual position; the ocular area is broader than long, and the length of the posterior row of eyes is slightly greater than that of the anterior one. The eyes of the intermediate row are rather nearer to the posterior than to the anterior lateral eyes.

The *legs* are moderately long and not very strong, except those of the first pair; these are long and of inordinate strength, especially the femoral joints; those of the fourth pair are longer than those of the second, and the third pair are rather the shortest; the first pair are of a dark reddish yellow-brown colour, armed with a double row of not very strong spines beneath the tibiæ and metatarsi, and furnished thickly, and chiefly underneath, with fine prominent hairs; the tarsi are paler-coloured than the rest, and (like those of the other pairs) have a small compact black scopula beneath their terminal claws; the other three pairs are of a brownish yellow (the femora strongly suffused with dark smoky brown) and furnished with hairs and fine spines.

The *palpi* are rather short and slender; they are of a dark reddish yellow-brown colour, furnished with hairs, many of which are nearly white; the radial joint is exceedingly short, shorter than the cubital, and its outer extremity terminates with a small curved, deep black-brown, pointed apophysis; the digital joint is oblong oval, and exceeds in length that of the cubital and radial joints together; its colour is deep brown, it is clothed with dark hairs, and at its extremity (which is rather of a truncate form) there are some short dull sandy-coloured ones; the palpal organs are simple in form, and extend a little backwards beneath the radial joint.

The *falces* are tolerably long and strong; they are also divergent and projecting forwards, and are armed with a strong tooth on their inner sides.

The *maxillæ* and *labium* are reddish yellow-brown, the latter being the darkest; and the *sternum* is small, oval, of a dull yellow colour, dark brown in front and on the margins.

The *abdomen* is of a long narrow oblong oval form, nearly half as long again as the cephalothorax, and not much more than half its width; the upperside is clothed with hairs, many of which are of a shining, rather golden-green hue, scintillating in different lights; it is of a dark brown colour, with a somewhat paler longitudinal central band, from which three well-marked though irregularly defined oblique yellowish stripes, clothed with white hairs, issue on either side; there are also two others of a similar nature on the fore margin, forming a curved anterior marginal border; the sides are closely striated, in a longitudinal direction with brown; and the underside is dull pale yellow, marked with a longitudinal central dark brown stripe, on each side of which, towards the margins, is a finer line of the same colour; these lines converge towards the spinners, which are rather long and prominent; those of the superior pair are pale yellow, black on the uppersides, the inferior pair being of a brighter yellow.

The adult female measures about 4½ lines in length, but differs very greatly in colours and markings from the male, though in general structure and form the sexes are much more nearly alike. The female has the sides of the cephalothorax yellow, deepening to a dark striated brown above, the caput black, clothed with fine pale hairs, and some long white ones on the clypeus; the two horn-like tufts of black bristles below and behind the lateral eyes of the anterior row are generally better defined than in the male.

The *legs* are yellow; those of the first pair tinged with orange-brown; these last are much the strongest, though not so disproportionately strong as in the male; they are scarcely longer, if so long as those of the fourth pair, the second pair being perhaps a little the shortest. The palpi are short, slender, yellow, semiannulated with black.

The *abdomen* is much longer in proportion than that of the male, being considerably more than double the length of the cephalothorax; its general colour is pale yellow, the upperside dark blackish brown, with a broadish, longitudinal, pale-yellowish, central, slightly dentated band, spotted sparingly with small black spots, and bisected longitudinally by a black line; the sides are very sparingly marked with brown; and the underside has seldom more than a fragment or two of the brown stripe and lines on that of the male.

Adult males, together with an adult and immature females, were found among rushes and herbage in a marsh near Alexandria. It is a very striking-looking Spider, allied to *Attus staintonii*, Cambr., and belongs to a group which has, as yet, no known representatives in Europe. From various points in its form and structure, it seems entitled to rank as generically distinct from the typical *Atti*; it appears indeed very similar in form to some species of the exotic genus *Mævia*, C. Koch; but at present, not possessing any type of *Mævia*, I am not able to determine whether or not it is identical in form and structure with the typical species of that genus.

Gen. YLLENUS, Thor.

YLLENUS SALIENS, sp. n. (Plate LX. fig. 92.)

Adult male, length 1½ line; adult female, 1¾ to 2 lines.

This minute but pretty little Spider is in general colours and markings very much like *Attus bonnetii*, Sav. (described above p. 611); it is, however, much smaller and generally of a brighter colour; the legs differ in length; and the palpi and palpal organs are very different in their form and structure.

The *cephalothorax* of the male, which is very massive, is of an orange-yellow-brown colour; the ocular area is thickly clothed with whitish or yellowish grey squamose adpressed hairs. The thoracic region has two longitudinal bands of white hairs, running backward from the eyes of the posterior row; these bands are often coalescent with other whitish hairs on the sides and hinder slope and those on the ocular area; in some examples a marginal band of white hairs is traceable; some examples have the sides and hinder slope clothed with reddish yellow hairs, and in these the white stripes show very distinctly; the clypeus, which is less in height than half the diameter of the fore central eyes, is clothed with pale dull scarlet (or perhaps, more correctly speaking, brick-red) hairs. The ocular area is broader than long, the hinder row being a little longer than the foremost one.

The *legs* are strong and moderately long; their relative length is 4, 1, 2, 3, those of the fourth pair, especially the femoral joints, being considerably the longest; their colour is yellow, furnished with hairs, bristles, and spines, the hairs being chiefly of a whitish hue, and the scopula beneath the tarsal claws blackish.

The *palpi* are short and resemble the legs in colour, and are pretty thickly furnished with long bristly white hairs; the radial joint is very short, shorter than the cubital, and has a blunt pointed yellow-brown apophysis at its outer extremity, tipped with black; the digital joint is long and of a narrow oblong oval form, clothed at the tip with black hairs; the palpal organs are large and of a somewhat globular form, they extend backwards beneath the radial joint, and are of a dark yellow-brown colour.

The *falces* are small and of a deep yellow-brown colour.

The *maxillæ*, *labium*, and *sternum* are yellow, clothed thinly with coarse grey hairs.

The *abdomen* is small, oval, and hairy; its colour is yellow; and it has a broad longitudinal central band, on its upperside, of an orange yellow-brown colour, often of a deep red-brown on the fore half, and showing traces of the normal curved or angular bars, or chevrons, of a dark yellow-brown colour on the hinder half; the sides have a longitudinal ill-defined orange-brown band, in some examples represented by a few short oblique stripes of that colour; the underside is of a pale straw yellow without any markings.

The *female* has the legs and palpi sometimes slightly annulated with dark brown, and the central abdominal stripe sometimes of a dark brown colour, and more dentated on the edges of the hinder part than in the male; in other respects the sexes are very much alike.

Adults of both sexes were found among the stems and at the roots of scattered stunted plants on the desert near Jebel y Silsilis. It is an exceedingly active Spider, the length of its leaps being remarkable, its long hind legs giving it no doubt great powers of jumping. Although so nearly resembling *Attus bonnetii* in colours and markings, the length of its hind legs will distinguish it readily. It is probably a common Spider, inasmuch as the seven examples I found were all at the base of one tuft of herbage.

Gen. PLEXIPPUS, Koch.

PLEXIPPUS ADANSONII.

Attus adansonii, Sav. et Aud. Egypte, p. 169, pl. vii. fig. 8.

Attus tardigradus, id. ibid. p. 170, pl. vii. fig. 13.

Attus oraniensis, Luc. Explor. Algér. p. 144, pl. v. fig. 8.

Attus nigrofuscus, Vins. Aran. des îles de la Réunion, Maurice et Madagascar, 1863, p. 59 et 302, pl. x. fig. 8.

Three adult males and an adult female were found at Cairo.

I feel no hesitation in determining the *Attus nigrofuscus*, Vinson, to be of this species. Savigny and Lucas figured only the males, while Vinson describes and figures the female alone. Numerous examples of both sexes received from Bombay and Ceylon agree exactly with the examples found both in Egypt and Palestine; nor can I find any difference in examples lately received from Edward Newton, Esq., from the Mauritius.

Gen. MENEMERUS, Sim.

MENEMERUS VIGORATUS.

Euophrys vigoratus, Koch, Die Arachn. xiv. p. 14, figs. 1282, 1283.

A single example of the female (immature), determined by M. Simon to be of this species, was found near Cairo.

MENEMERUS HEYDENII.

Menemerus heydenii, Sim. Monogr. des Att. d'Europe, Ann. Soc. Ent. Fr. 1868, 4^{e} sér. viii. p. 665.

Adult and immature examples of both sexes were found not unfrequently upon the trunks of palm trees near Cairo and in Upper Egypt.

MENEMERUS ANIMATUS, sp. n. (Plate LX. fig. 89.)

Adult male, length 2½ lines.

The *cephalothorax* is of a rather flattened form; its colour is dark-brown, with a broad yellowish marginal band, a large, somewhat subtriangular patch on the thorax (continued down the hinder slope in a narrow band) of the same colour, and a small spot behind each posterior eye, densely clothed with white depressed hairs, with which also the ocular area and the clypeus are more or less clothed; brown and golden-yellowish hairs are also often intermixed with the others on the ocular area.

The *eyes* are in the ordinary position; the ocular area appears to be about equal in length and breadth; the length, however, of the anterior row exceeds slightly that of the posterior one; and the eyes of the intermediate row are rather nearer to the posterior than to the anterior one.

The *legs* are moderate in length and strength; they do not differ greatly in their length, which appears to be relatively 4, 1, 3, 2; their colour is yellow; and they are furnished sparingly with hairs, slender bristles, and spines, each tarsus terminating with a small dark-coloured scopula beneath the tarsal claws.

The *falces* are of moderate size and strength, and are placed rather far back, owing to the projection of the ocular area; they are slightly divergent, and project a little from a vertical position; their colour is a deep rich red-brown; and their surface is marked with numerous transverse ingrained striations.

The *palpi* are of moderate length; and their colour is yellow, the radial joints yellow-brown; the humeral joint is very strong and tumid underneath, with a strong, pointed, tooth-like spur or prominence near its base on the outer side; this joint is thickly clothed with coarse white hairs: the radial joint is shorter than the cubital, but is produced laterally on each side, and has a pointed apophysis at its extremity underneath; the digital joint is large, and of an elongate oval form and dark red-brown colour, clothed with dark hairs, a few at the anterior extremity being of a paler hue. The palpal organs are not complex, but highly developed and prominent, extending far backwards beneath, and on the inner side of, the radial joint.

The *maxillæ* and *labium* are blackish-brown, tipped with pale yellow.

The *sternum* is oval, and of a yellow colour.

The *abdomen* is oval, of a somewhat flattened form, and sparingly clothed with hairs; its colour is yellow, marked, but not strongly, on the upperside with yellow-brown, giving some faint indications of an irregular longitudinal central yellowish band (along the fore half of which is a dark marking), and some short, oblique, slightly curved lateral stripes issuing from its hinder half; the lateral margins also of the upperside are irregular, being in some examples marked with short alternate yellowish and yellow-brown oblique markings.

The female resembles the male in colours and markings, though those of the cephalothorax are less strong and distinct than in that sex.

Adults of both sexes were found on rocks and walls in Upper Egypt, and three immature examples near Alexandria.

MENEMERUS INTEREMPTOR, sp. n.

Adult female, length 4 lines.

This Spider is nearly allied to *M. animatus*, but is considerably larger, and though resembling it in its general hue, is even less distinct in its markings.

The *cephalothorax* is dark yellow-brown, darkest on the caput, and with an indistinct yellowish marginal band; the whole surface is clothed, but not very densely, with yellowish-grey, mixed with a somewhat golden pubescence. The ocular area is broader than long; and the length of the hinder row of eyes is a little greater than that of the anterior row.

The *legs* are moderately strong, and not very long; their relative length appears to be 4, 1, 3, 2, though the difference, if any, between 4 and 1, and 3 and 2, respectively, is very slight; those of the first two pairs are yellow-brown, the third and fourth being yellow; all are furnished, but not very conspicuously, with hairs, slender bristles, and spines; the tarsi are furnished at their extremities with a small black scopula beneath the tarsal claws, which have only a single, scarcely visible denticulation near the middle of their underside.

The *palpi* are slender, of moderate length, and fringed thickly on each side with coarse white hairs.

The *falces* are deep reddish black-brown, the *maxillæ* and *labium* being dark yellow-brown, tipped with yellowish-white, and the *sternum* dull orange-yellow.

The *abdomen* is yellow, slightly suffused with yellow-brown on the upperside, which has an indistinct and rather irregular marginal brownish line, enclosing nearly its whole area, the enclosed space being narrower behind than before, and containing a longitudinal central tapering band, very faintly defined by two lines of a slightly paler hue than the rest; the sides are marked with a few faint, brownish, horizontal lines or short stripes; the underside is yellow, immaculate, the spinners short and of a yellow-brown colour; the genital aperture is of a transverse oval form, and connected with a rather large dark yellow-brown somewhat quadrate area.

Several adult and immature females, with an immature male, were found near Cairo.

Gen. EPIBLEMUM, Hentz (*Calliethera*, C. Koch).

EPIBLEMUM TRICINCTUM.

Calliethera tricincta, C. Koch, Die Arachn. xiii. p. 50, pl. xliv. fig. 1117.

Two adult females of this species were found near Alexandria. It is very nearly allied to *E. scenicum*, Koch., but may easily be distinguished by the oblique lateral white stripes uniting and forming transverse bands across the abdomen.

EPIBLEMUM PALUDIVAGUM.

Salticus paludivagus, Luc. Explor. Algér. p. 167, pl. viii. fig. 7.

A single adult female (concluded by M. Simon to be of this species) was found near Alexandria.

Gen. HELIOPHANUS, C. Koch.

HELIOPHANUS DECORATUS.

Salticus cupreus, Sav. et Aud. Egypte, p. 171, pl. vii. fig. 15.

Heliophanus decoratus, L. Koch, Ægyptische und abyss. Arachn. 1875, p. 87, pl. vii. fig. 8.

Adult examples of both sexes were found among plants on the walls of the fortifications near Alexandria.

There is no doubt about the distinctness of this Spider from *H. cupreus*, Walck. (Europe); and I feel confident that it is the same as that described and figured by Savigny and Audouin, and (lately) by Dr. L. Koch (*loc. cit. supra*). It is very nearly allied to, perhaps identical with, *H. facetus*, Cambr., found in Palestine.

Gen. Salticus, Sim. (Latr. ad part.).

Salticus todillus.

Salticus todillus, Sim. Monogr. Att. d'Europe, Ann. Soc. Ent. Fr. 4e sér. 1868, tom. viii. p. 713, pl. iii. fig. 15; Cambr. Spid. Palest. and Syria, P. Z. S. 1872, p. 324, pl. xiv. fig. 19.

Examples of this very distinct and pretty little *Salticus* were found under stones near Alexandria.

Salticus repudiatus, sp. n.

Adult female, length 2 lines.

This Spider is nearly allied to, but quite distinct from *S. todillus*, Sim.

The *cephalothorax* is of a flattened oblong form, the fore extremity almost squarely truncated, and the hinder slope slight, and somewhat rounded in profile; it is of an orange-yellow brown colour, with two broad longitudinal dark brown bands running from the hinder extremity, through the posterior eyes, to the fore part of the ocular area, in the dark blackish-brown colouring of which they merge.

The *eyes* are in the ordinary position; the ocular area is longer than broad, and its fore part is very projecting; the eyes of the intermediate row are much nearer to the anterior than to the posterior row, and are placed within the straight line of the lateral eyes of those two rows.

The *legs* are moderately long, their relative length being 4, 1, 3, 2; those of the three posterior pairs are slender, and, except the metatarsi of the second pair, furnished with hairs only; the femora, genua, and tibiæ of the first pair are very much stronger than those of any of the rest, of a yellow-brown colour, the tibial joints much darker, and, with the metatarsi, armed beneath with two longitudinal parallel rows of four strong spines in each row; the legs of the second pair are yellow, the tibiæ marked on each side forwards with brown; those of the third and fourth pairs are yellow; all the tarsi have a small dark scopula beneath the terminal claws.

The *palpi* are moderately long, slender, and of a yellow colour.

The *falces* are small, vertical, yellow-brown, and placed far back beneath the fore part of the cephalothorax.

The *maxillæ* and *labium* are yellow-brown, the *sternum* yellow, and of a narrow oval form.

The *abdomen* is of an elongate oval form, constricted towards the fore part, and joined to the cephalothorax by a short but distinct pedicle; its colour is yellow-brown, paler in the region of the constriction and on the sides of the fore extremity; a small oblong patch at the fore extremity, as well as most of the hinder half, are shining and of a somewhat corneous appearance, the hinder extremity also deepening considerably in colour; the underside is much paler, with two faint longitudinal, parallel, dusky-brown bands.

A single example of the adult female was found under a stone near Alexandria.

List of Species above described and recorded.

Fam. FILISTATIDES.

Filistata testacea, Latr., p. 543.
—— *puta*, sp. n., p. 544.

Fam. ŒCOBIIDES.

Œcobius putus, sp. n., p. 544, Plate LVIII. fig. 1.
—— *templi*, sp. n., p. 545, Plate LVIII. fig. 2.
—— *annulipes*, Luc., p. 546.
Uroctea limbata, C. Koch, p. 546.

Fam. DYSDERIDES.

Ariadne insidiatrix, Sav., p. 547.
Dysdera lata, Reuss, p. 547.
Oonops scutatus, sp. n., p. 547, Plate LVIII. fig. 2 A.
—— *pauper*, sp. n., p. 549.

Fam. DRASSIDES.

Gnaphosa plumalis, Cambr., p. 550.
—— *conspersa*, id., p. 550.
—— *procera*, id., p. 550.
—— *marginata*, id., p. 551.
—— *venatrix*, id., p. 551.
Drassus mundulus, id., p. 551.
—— *senilis*, id., p. 551.
—— *infumatus*, id., p. 551.
—— *ornatus*, id., p. 551.
—— *campestratus*, id., p. 551.
—— *alexandrinus*, id., p. 551.
—— *ægyptius*, id., p. 552.
—— *vulpinus*, id., p. 552.
—— *denotatus*, id., p. 552.
—— *pugnax*, id., p. 552.
Prosthesima læta, Cambr., p. 552.
—— *picina*, id., p. 552.
—— *tristicula*, id., p. 552.
—— *curina*, id., p. 552.
—— *nilicola*, id., p. 552.
—— *mollis*, id. p. 553.
—— *pallida*, id., p. 553.
—— *inaurata*, id., p. 553.
Micaria cincta, L. Koch, p. 552.
Cheiracanthium dubium, id., p. 553.
—— *equestre*, id., p. 553.
—— *isiacum*, Cambr., p. 553.
—— *tenuissimum*, L. Koch, p. 553.
—— *annulipes*, id., p. 553.

Fam. PALPIMANIDES.

Palpimanus hæmatinus, C. Koch, p. 554.
—— *savignyi*, Sav., p. 554.

Fam. ERESIDES.

Eresus petagnæ, id., p. 554.
—— *dufourii*, id., p. 554.

Fam. DICTYNIDES.

Dictyna innocens, Cambr., p. 555.
—— *conducens*, sp. n., p. 556, Plate LVIII. fig. 3.
—— *condocta*, sp. n., p. 556, Plate LVIII. fig. 4.

Fam. AGELENIDES.

Titanœca distincta, Cambr., p. 557.
Agelena lepida, sp. n., p. 558.
Tegenaria proxima, Cambr., p. 559.
Textrix coarctata, Duf., p. 559.
Enyo nitida, Sav., p. 559.
—— *expers*, sp. n., p. 560.

Fam. HERSILIIDES.

Hersilia caudata, Sav. et Aud. (var. *diversa*, Cambr.), p. 560, Plate LVIII. fig. 6.
Hersilidia lucasii, sp. n., p. 562, Plate LVIII. fig. 5.

Fam. SCYTODIDES.

Loxoscelis rufescens, Duf., p. 564.
Scytodes thoracica, Walck., p. 564.
—— *kochii*, sp. n., p. 564.

Fam. PHOLCIDES.

Pholcus semicaudatus, sp. n., p. 565.
—— *rivulatus*, Sav. et Aud., p. 566.

Fam. THERIDIIDES.

Latrodectus erebus, Sav. et Aud., p. 567.
Lithyphantes hamatus, Koch, p. 568.
Steatoda signata, sp. n., p. 568.
—— ? *mandibulare*, Luc., p. 568.
Euryopis acuminata, Luc., p. 569.
—— *scripta*, Cambr., p. 569.
—— *quadrimaculata*, sp. n., p. 569.
Theridion rufolineatum, Luc., p. 569.
—— *varians*, Koch, p. 570.
—— *spinitarsis*, sp. n., p. 570.
—— *melanostictum*, sp. n., p. 570.
Mimetus monticolus, Bl., p. 571.
Erigone spinosa, Cambr., p. 572.
—— *alexandrina*, id., p. 572.
Linyphia extricata, sp. n., p 572, Plate LIX. fig. 7.
Pachygnatha argyrostilba, sp. n., p. 573, Plate LIX. fig. 8.

Fam. EPEÏRIDES.

Tetragnatha molesta, Cambr., p. 574.
—— *nitens*, Sav., p. 574.
—— *flava*, id., p. 574.
—— *filiformis*, id., p. 575.
—— *pelusia*, id., p. 575.

Singa affinis, sp. n., p. 575.
—— *lucina*, Sav., p. 575.
Argiope aurelia, Sav., p. 576.
—— *sticticalis*, sp. n., p. 576.
Cyrtophora opuntiæ, Duf., p. 576.
Epeïra chloris, Sav., p. 576.
—— *suspicax*, sp. n., p. 577.
—— *perplicata*, Cambr., p. 577.
—— *circe*, Sav., p. 577.
—— *dromedaria*, Walck., p. 577.
—— *atomaria*, sp. n., p. 577, Plate LIX. fig. 9.

Fam. Uloborides.

Uloborus signatus, sp. n., p. 579.

Fam. Thomisides.

Thomisus lateralis, C. Koch, p. 580.
—— *spinifer*, Cambr., p. 580.
Diæa diana, Sav., p. 580.
—— *candicans*, sp. n., p. 580.
Xysticus hirtus, Sav., p. 581.
—— *promiscuus*, sp. n., p. 581.
—— *ferus*, sp. n., p. 583.
—— *peccans*, sp. n., p. 584.
—— *subclavatus*, sp. n., p. 584.
Selenops ægyptiaca, Sav., p. 585, Plate LIX. fig. 10.
Sparassus walckenaerius, Sav., p. 587.
—— *cognatus*, sp. n., p. 588.
—— *suavis*, sp. n., p. 588.
Artanes bigibba, sp. n., p. 590.
—— *lugens*, sp. n., p. 591.
Thanatus albini, Sav., p. 591.
—— *lineatipes*, sp. n., p. 591.
—— *flavus*, sp. n., p. 592.
—— *flavescens*, sp. n., p. 592.
Philodromus adjacens, sp. n., p. 592, Plate LIX. fig. 11.
—— *medius*, Cambr., p. 594.
—— *cinereus*, sp. n., p. 594.
—— *venustus*, sp. n., p. 595, Plate LIX. fig. 12.

Fam. Lycosides.

Nilus (gen. nov.) *curtus*, sp. n., p. 596, Plate LIX. fig. 13.
Pirata leopardus, Sund., p. 598.
—— *proxima*, sp. n., p. 598.
Trochosa partita, sp. n., p. 599.
—— *depuncta*, sp. n., p. 600.
—— *pilipes*, Luc., p. 600.
—— *virulenta*, sp. n., p. 600.
—— *urbana*, sp. n., p. 601, Plate LX. fig. 14.
Trochosa effera, Cambr., p. 601.
Tarentula tarentulina, Sav., p. 601.
—— *truculenta*, sp. n., p. 601.
—— *tremens*, sp. n., p. 602.
Lycosa ungulata, sp. n., p. 603.
—— *fidelis*, Cambr., p. 604.
—— *injucunda*, sp. n., p. 605, Plate LX. fig. 15.
—— *iniqua*, sp. n., p. 605.
—— *inquieta*, sp. n., p. 606.
—— *inopina*, sp. n., p. 607, Plate LX. fig. 16.
—— *observans*, sp. n., p. 608.

Fam. Sphasides.

Oxyopes alexandrinus, Sav., p. 609.
—— *bilineatus*, sp. n., p. 609.

Fam. Salticides.

Ballus piger, sp. n., p. 609.
Attus delectus, Cambr., p. 610, Plate LX. fig. 88.
—— *mouffettii*, Sav., p. 610.
—— *staintonii*, Cambr., p. 610.
—— *spiniger*, id., p. 610, Plate LX. fig. 103.
—— *paykullii*, Sav., p. 610.
—— *soldanii*, id., p. 611.
—— *monardi*, Luc., p. 611.
—— *fulgens*, Cambr., p. 611.
—— *regillus*, L. Koch, p. 611, Plate LX. fig. 17.
—— *bonnetii*, Sav., p. 611.
—— *oculatus*, sp. n., p. 612, Plate LX. fig. 90.
—— *mendicus*, sp. n., 614.
—— *mendax*, sp. n., p. 615.
—— *effigies*, sp. n., p. 616.
—— *memorialis*, sp. n., p. 617.
—— *memorabilis*, sp. n., p. 618, Plate LX. fig. 110.
Yllenus saliens, sp. n., p. 620, Plate LX. fig. 92.
Plexippus adansonii, Sav., p. 622.
Menemerus vigoratus, Koch, p. 622.
—— *heydenii*, Sim., p. 622.
—— *animatus*, sp. n., p. 622, Plat LX. fig. 89.
—— *interemptor*, sp. n., p. 623.
Epiblemum tricinctum, C. Koch, p. 624.
—— *paludivagum*, Luc., p. 624.
Heliophanus decoratus, L. Koch, p. 624.
Salticus todillus, Sim., p. 625.
—— *repudiatus*, sp. n., p. 625.

List of Egyptian Spiders not found by myself, but described and recorded by other Authors.

Fam. THERAPHOSIDES.

Nemesia cellicola, Sav. et Aud.
Chætopelma ægyptiaca, Dol.

Fam. DYSDERIDES.

Dysdera erythrina, Sav. et Aud. (probably not *D. erythrina*, Walck.).

Fam. ŒCOBIIDES.

Uroctea durandi, Duf.
—— *goudoti*, C. Koch.

Fam. DRASSIDES.

Gnaphosa lentiginosa, C. Koch.
—— *schaefferi*, Sav. et Aud.
—— *linnæi*, id.
Micaria albini, Sav. et Aud.
Drassus lyonettii, iid.
—— *listeri*, iid. (*Clubione*).
Prosthesima listeri, iid. (*Drassus*).

Fam. ERESIDES.

Eresus pharaonius, Walck.
—— *molitor*, C. Koch (genus *Stegodyphus*, Sim.).
—— *fuscifrons*, id.
—— *lituratus*, id.
—— *semicinctus*, id.

Fam. AGELENIDES.

Lachesis perversa, Sav. et Aud.
Arachne timida.
Tegenaria (?) *familiaris*, Sav. et Aud. (*Arachne*).
—— *pagana*, Koch (L. Koch, 'Ægypt. und abyss. Arachn.').

Fam. ENYOIDES.

Enyo longipes, Sav. et Aud.

Fam. SCYTODIDES.

Scytodes immaculata, L. Koch ('Ægypt. u. abyss. Arachn.').

Fam. PHOLCIDES.

Artema convexa, Bl. (*Pholc. borbonicus*, Vins., L. Koch, 'Ægypt. und abyss. Arachn.,' 1875, p. 25).

Fam. THERIDIIDES.

Theridion vagulans, L. Koch (*l. c. supra*).
—— *triangulosum*, Walck. (L. Koch, *l. c.*)
Latrodectus 13-*guttatus*, Rossi, = *L. argus*, Sav. et Aud.
—— *martius*, Sav. Walck. (i. p. 645) denies the fact of its being an Egyptian Spider; but M. Simon ("Aran. nouv. ou peu connus de l'Europe, 2^{e} Mém.," Mém. Liége, 1873) states it to be so.
Lithyphantes venator, id. (*Latrodectus*).
—— *ephippiatus*, Thor.
Erigone vagans, Sav. et Aud.

Fam. EPEÏRIDES.

Argiope sericea, Oliv. (Sav. et Aud.).
—— *splendida*, Sav. et Aud.
Epeira armida, Sav. et Aud.
—— *umbratica*, id. (nec *umbratica*, C. K.).

Fam. Thomisides.

Thomisus peronii, Sav. et Aud.
—— *martyni*, iid.
Misumena buffonii, iid. (*Thomisus*).
Diæa globosa, Fabr. (*Thomisus rotundatus*, Sav. et Aud.).
Xysticus lalandi, id. (*Thomisus*, Sav. et Aud.).
—— *clerckii*, id. (*Thomisus*, iid.).
Sparassus clerckii, id. (*Philodromus*, iid.).
—— *argelasius*, Latr. (*Phil. linnæi*, Sav. et Aud.).
Thanatus fabricii, Sav. et Aud. (*Philodromus*).
—— *rhombiferens*, iid. (*Philodromus*).

Fam. Lycosides.

Ocyale atalanta, Sav. et Aud.
Dolomedes hippomane, iid.
Trochosa pelliona, iid. (*Lycosa*).
—— *nilotica*, iid. (*Lycosa*).
—— *annulipes*, L. Koch ('Ægypt. u. abyss. Arachn.').
Lycosa arenaria, Sav. et Aud.
—— *peregrina*, iid.
—— *pelusiaca*, iid.
—— *serena*, L. Koch ('Ægypt. und abyss. Arachn.').

Fam. Salticides.

Attus frischii, Sav. et Aud. (*Salticus*).
—— *druryi*, iid. (*Salticus*).
—— *gesneri*, iid. (*Salticus*).
—— *hunteri*, iid. (*Salticus*).
—— *illigeri*, iid. (*Salticus*).
—— *redii*, iid. (*Salticus*).
Euophrys plebeja, L. Koch ('Ægypt. u. abyss. Arachn.').
Ælurops dorthesii, Sav. et Aud. (*Salticus*).

EXPLANATION OF THE PLATES.

Plate LVIII.

Fig. 1. *Œcobius putus*, sp. n., p. 544.
a, Spider, enlarged; *b*, eyes, from the front; *c*, right palpus, from inner side; *d*, natural length of Spider.

2. *Œcobius templi*, sp. n., p. 545.
a, Spider, enlarged; *b*, eyes, from the front; *c*, right palpus, from inner side; *d*, genital aperture (♀); *e*, natural length.

2 a. *Oonops scutatus*, sp. n., p. 547.
a, Spider, enlarged; *b*, underside, with legs truncated; *c*, profile, ditto; *d*, eyes, from the front; *e*, *f*, palpus in two positions; *g*, natural length.

3. *Dictyna conducens*, sp. n., p. 556.
a, Spider, enlarged; *b*, profile, without legs; *c*, cephalothorax and falces, from the front; *d*, *e*, palpus in two positions; *f*, genital aperture (♀); *g*, natural length.

4. *Dictyna condocta*, sp. n., p. 556.
a, Spider, enlarged; *b*, profile, without legs; *c*, cephalothorax and falces, from the front; *d*, *e*, left palpus in two positions; *f*, natural length.

6. *Hersilia caudata*, Sav. et Aud., p. 560.
a, Spider, enlarged; *b*, eyes and falces, from the front; *c*, natural length.

5. *Hersilidia lucasii*, sp. n., p. 562.
a, Spider, enlarged; *b*, eyes, from the front; *c*, *d*, left palpus in two positions; *e*, natural length.

PLATE LIX.

Fig. 7. *Linyphia extricata*, sp. n., p. 572.
a, Spider, enlarged; *b*, profile, without legs; *c*, right palpus, on outer side; *d*, genital aperture (♀); *e*, natural length.

8. *Pachygnatha argyrostilba*, sp. n., p. 573.
a, Spider, enlarged; *b*, eyes and falces, from the front; *c*, *d*, right palpus in two positions; *e*, natural length.

9. *Epeïra atomaria*, sp. n., p. 577.
a, Spider, enlarged; *b*, profile, ditto; *c*, abdomen, ditto; *d*, *e*, palpus in two positions; *f*, natural length.

10. *Selenops ægyptiaca*, Sav. et Aud., p. 585.
a, Spider, natural size; *b*, profile, enlarged, without legs; *c*, eyes and falces, from the front; *d*, *e*, palpus in two positions.

11. *Philodromus adjacens*, sp. n., p. 592.
a, Spider, enlarged; *b*, eyes and falces, from the front; *c*, *d*, right palpus in two positions; *e*, genital aperture (♀); *f*, natural length.

12. *Philodromus venustus*, sp. n., p. 595.
a, Spider, enlarged; *b*, eyes, from the front; *c*, genital aperture; *d*, natural length.

PLATE LX.

13. Gen. nov. *Nilus curtus*, sp. n., p. 596.
a, Spider, enlarged; *b*, eyes, from the front; *c*, maxillæ and labium; *d*, terminal claws at extremity of tarsus; *e*, natural length.

14. *Trochosa urbana*, sp. n., p. 601.
a, Spider, enlarged; *b*, *c*, palpus in two positions; *d*, genital aperture (♀); *e*, natural length (♂).

15. *Lycosa injucunda*, sp. n., p. 605.
a, Spider, enlarged; *b*, *c*, palpus in two positions; *d*, genital aperture (♀); *e*, natural length (♂).

16. *Lycosa inopina*, sp. n., p. 607.
a, Spider, enlarged; *b*, *c*, palpus in two positions; *d*, natural length.

88. *Attus delectus*, Cambr., p. 610.
a, Spider, enlarged; *b*, ditto in profile, without legs; *c*, female, from above, without legs or palpi; *d*, *e*, right palpus in two positions; *f*, natural length (♀); *g*, ditto (♂).

103. *Attus spiniger*, Cambr., p. 610.
a, Spider, enlarged; *b*, ditto in profile, without legs; *c*, *d*, right palpus in two positions; *e*, natural length.

17. *Attus regillus*, L. Koch., p. 611.
a, Spider, enlarged; *b*, ditto in profile, without legs; *c*, *d*, right palpus in two positions; *e*, natural length.

90. *Attus oculatus*, sp. n., p. 612.
a, Spider, enlarged; *b*, ditto in profile, without legs; *c*, *d*, right palpus in two positions; *e*, natural length (♂); *f*, genital aperture (♀).

110. *Attus memorabilis*, sp. n., p. 618.
a, Spider, enlarged; *b*, ditto in profile, without legs; *c*, female, above, without legs; *d*, *e*, right palpus in two positions; *f*, natural length (♂); *g*, ditto (♀).

92. *Yllenus saliens*, sp. n., p. 620.
a, Spider, enlarged; *b*, ditto in profile, without legs; *c*, *d*, right palpus in two positions; *e*, natural length.

89. *Menemerus animatus*, sp. n., p. 622.
a, Spider, enlarged; *b*, ditto in profile, without legs; *c*, *d*, palpus in two positions; *e*, natural length.

4. Note on the "Africa-Indien" of A. von Pelzeln, and on the Mammalian Fauna of Tibet. By W. T. BLANFORD, F.R.S., F.Z.S.

[Received June 6, 1876.]

I am indebted to the kindness of Herr August von Pelzeln for copies of two papers lately written by him on the mammalian fauna and avifauna of India and Malayasia. The first, entitled "Africa-Indien"[*], was published last year; the second, on the Mammalian fauna of the Malay countries[†], has just reached me. These papers are well worthy the attention of all interested in the question of the geographical distribution of animals. I have for some years past contended that the fauna of India proper, or Hindustan as it is often called on European maps (Hindustan in India itself has a much more restricted signification), is not an integral part of the so-called "Indian region" of Dr. Sclater and other naturalists. My views were adopted by the late Dr. Stoliczka, and were identical with those held by Mr. Blyth[‡]. It is very satisfactory to find similar views enforced independently by so high an authority as Herr von Pelzeln and in so careful an essay.

The whole world is divided by v. Pelzeln into six regions, viz:—

I. The Arctic (comprising the Palæarctic and Nearctic of Sclater).

II. The American Tropical (Neotropical of Sclater).

III. The Australian.

IV. The Ethiopian.

V. The Hindustan (India and Ceylon).

VI. The Malay, including the Himalaya, Tibet, Southern China with Formosa, "Hinter-Indien" (*i. e.* Burma, Siam, and the Malay peninsula), the Sunda archipelago up to Wallace's line—and probably Madagascar, the Mascarene, Comoro, and Seychelles Islands (Lemuria).

I am rather disposed, with Andrew Murray[§], to unite the Ethiopian and Malay regions with India and Lemuria into one great region; and I still hold that the hills of Southern India with the Malabar coast and Southern Ceylon form a province of the Malay region, whilst the greater portion of the Indian peninsula is African in its affinities [*]. This subject, however, is too large for discussion in the present note, the principal object of which is to point out a correction which is, I think, of some importance, with regard to the fauna of Tibet. This is, by v. Pelzeln, included in the Malay region: he comprises the typical Tibetan genera such as *Panthalops* and *Poëphagus* in his list of Malay forms; and on the map accompanying the paper on the Malay mammal-fauna the Kuenluen range is shown as the northern limit of the region.

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[*] "Africa-Indien, Darstellung der Beziehungen zwischen der africanischen und indo-malayischen Vogel-Fauna nebst allgemeineren Betrachtungen über die geographische Verbreitung der Säugethiere, von August von Pelzeln, Custos des k.-k. zoologischen Hof-Cabinets," Verhandl. k. k. zool.-bot. Ges. Wien, 1875, pp. 33-62.

[†] Ueber die malayische Säugethier-Fauna von August von Pelzeln. Separat-Abdruck aus dem Festschrift zur Feier des 25-jährigen Bestehens des k.-k. zool.-bot. Ges. in Wien.

[‡] See his remarks on the division of the earth into zoological regions; Nature, 1871, vol. iii. p. 427.

[§] 'Geographical Distribution of Mammals,' p. 304. I may remark that Mr. Murray's maps, so far as they exhibit the distribution of particular genera in India, are frequently incorrect. Thus Map xx. represents that there is no Wolf in India, whilst in Maps xxv., xxvii., xli., xlvi., and lxiii. the following mammals are represented as ranging more or less throughout the peninsula to Cape Comorin—*Mydaus*, *Helictis*, Binturong, Wild Ass, Rhinoceros, and European Mole! With the doubtful exception of the Rhinoceros, not one of these animals is found in the peninsula of India, the Wild Ass being confined to the deserts of Cutch and Bikanir. There are other mistakes in matters of detail.

The fauna of the Tibetan plateau has, in reality, no Malay affinities; but the cause of the misunderstanding is simple. The two naturalists to whose writings one naturally turns for information about Tibetan animals, are Mr. Hodgson and Père David; and both are eminently misleading, since both collected simultaneously specimens from two faunas which have in fact scarcely a generic type in common—the Himalayan, which is quite correctly classed by v. Pelzeln as a subdivision of the Malay region, and the Tibetan, which is part of Blyth's Mongolian province belonging to the Boreal or Palæarctic region. The former possessess a very rich fauna with numerous peculiar types; the latter is poor in species, though individuals are locally numerous. It is consequently not surprising that the few members of the Tibetan fauna which show peculiarity should be ignored amongst the vast bulk of Himalayan genera, and that Tibet should be assigned to the Malay region.

On the southern slopes of the Himalayas there is everywhere, until it has been cleared, luxuriant forest up to at least 12,000 feet above the sea, inhabited by a fauna which extends without any great change of generic forms, throughout the Malay peninsula and into the hill-tracts of some at least of the Malay islands [†]. Immediately [‡] north of the main Himalayan range, a cold, barren, and desert region of mountains and plateaux extends, swept by winds from which all moisture has been drained by the high mountain-chains on all sides. To this tract not one of the forest-haunting inhabitants of the Himalayas ever penetrates, although many of them extend far into the mountains along the damp and richly wooded valleys of rivers. The fauna of these Tibetan plateaux is essentially Boreal, Alpine and even Arctic types prevailing, the country having in many parts a climate scarcely equalled elsewhere for intensity of cold out of the Arctic regions. This high barren tableland extends from Afghanistan to Yunan; it comprises the drainage-areas of the Upper Indus and the Sanpú, and is bounded on the north in its western portion by the Kuenluen range; but it is less defined and its boundaries less accurately known to the eastward, although much light has been thrown upon the subject by Prejewalski's explorations.

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[*] J. A. S. B. 1870, vol. xxxix. pt. 2. p. 336.

[†] Elwes, P. Z. S. 1873, p. 615.

[‡] How sudden the change is, in places, is admirably described in Hooker's 'Himalayan Journals,' vol. ii. p. 158.

Lately, when examining the collections brought by Dr. Stoliczka from Western Tibet and Eastern Turkestan, I endeavoured to make a list of the mammals known to inhabit the Tibetan plateau. The list is naturally very imperfect; but still, I think, it is of some value, because it serves completely to dissipate the idea of there being any thing in common between the fauna of Tibet and that of the Himalayan-forest region or the Malay region. It is quite true that a few forms such as *Lagomys* and *Arvicola* extend into the alpine portion of the Himalayan region; but this may be partly due to a law of diffusion which is always found to prevail on the edge of two different zoological provinces, if no impassable physical barrier intervenes. Moreover the Himalayan species are generally distinct from the Tibetan; and they may be members of a Boreal fauna to which *Cervus cashmeriensis* and *Ursus isabellinus* * belong, and which is well developed in Kashmir and may, I think, be traced throughout the Himalayas.

In the list which I append, W. is added to the names of all species only known from Western Tibet, E. to those hitherto brought from Eastern Tibet alone.

LIST OF MAMMALIA KNOWN TO INHABIT THE TIBETAN PLATEAU.

CHIROPTERA.

Plecotus auritus. W.

INSECTIVORA.

Sorex (*Crocidura*) *myoides.* W.

CARNIVORA.

Felis uncia.
Felis manul. E.
Felis isabellina.
Canis laniger (=*C. chanco*).
Canis niger (perhaps a variety of the foregoing).
Canis (*Vulpes*) *montanus* (=*C. flavescens*).
Canis (*Vulpes*) *ferrilatus.* E.
Canis (*Cuon*) *alpinus* † ?
Martes toufæus.
Mustela erminea.
Mustela temon.
Putorius larvatus. E.
Lutra, sp. W.

RODENTIA.

Arctomys caudatus. W.
A. himalayanus (=*A. robustus*).
Sciurus europæus? E.
Mus crassipes? W.
Arvicola blythi (= *Phaiomys leucurus*, Blyth). W.
Arvicola stoliczkanus. W.
Lepus tibetanus. W.
Lepus oistolus (perhaps the same as the next).
Lepus pallipes.
Lepus hypsibius. W.

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* Neither of these species is found, except as a straggler, on the north of the dividing range between Kashmir and Ladák.

† It is more probably this species (which Gray, Cat. Carn. &c. Mamm. B. M. 1869, p. 184 has shown to be a *Cuon*) than the Indian *C. rutilans* which inhabits Tibet.

Lagomys ladacensis (=*L. curzoniæ*, Stol. nec Hodgs.). W.
Lagomys auritus. W.
? *Lagomys curzoniæ* (?=*L. tibetanus*). E.

Ungulata.

Equus hemionus.
Bos grunniens.
Ovis hodgsoni.
Ovis vignei. W.
Ovis nahura.
Capra sibirica.
Panthalops hodgsoni.
Gazella picticauda.

It is possible that *Budorcas taxicolor*, the Musk-deer, and *Cervus affinis* should be added; but I have grave doubts as to whether any of these are really found on the Tibetan plateau. *Budorcas* may, like *Nemorhædus* and *Hemitragus*, be Himalayan, whilst I suspect that the Musk-deer and *Cervus affinis* belong to the Boreal or Palæarctic types of the Himalayan alpine fauna already referred to. I feel also very doubtful whether *Lagomys curzoniæ* is the species found in the Tibetan valleys north of Sikkim. The Chumbi valley, whence *Lagomys curzoniæ* and *Cervus affinis* are said to have been procured, belongs politically to Tibet, but it is Cis-Himalayan.

I should point out that this slight correction in no way invalidates any of Herr v. Pelzeln's views. There are a few errors in matters of detail, such as the inclusion of *Gazella*, *Antilope*, and *Mellivora* in the list of Malay genera, on the ground, apparently, of their supposed occurrence in Nipal. This must, I think, be due to the British-Museum catalogues of Mr. Hodgson's collections, in which a considerable number of animals are included, obtained from other parts of India than Nipal, although there is no means afforded by the catalogue of distinguishing them from the species collected in the Himalayas.

In conclusion I can only call attention to the very interesting palæontological suggestions at the end of Herr v. Pelzeln's papers. He considers the Malay fauna to be allied to that which inhabited Europe in older Miocene times, while he associates the newer Miocene mammalian fauna of Europe and India with that inhabiting the Ethiopian region at the present day. I can only remark upon this that several of the early Miocene forms of Europe (e. g. *Erinaceus*, *Castor*, *Myoxus*, *Cricetodon*, *Hyomoschus*, *Antilope*) are not Malay forms at present, and that the last two are African, whilst part of the apparent similarity is perhaps due to the warm climate of the early Miocene epoch in Europe—and that the Indian Sevaliks are much more probably Pliocene than Miocene. It is, however, very unfair to dismiss a carefully reasoned argument with a criticism of this kind; and I only regret that, just at present, time will not allow me to do justice to Herr v. Pelzeln's views.

5. On some of the Specific Identifications in Dr. Günther's Second Report on Collections of Indian Reptiles obtained by the British Museum. By W. T. BLANFORD, F.R.S., F.Z.S.

[Received June 6, 1876.]

Dr. Günther, in his "Second Report on Collections of Indian Reptiles obtained by the British Museum" (P. Z. S. 1875, p. 224), has made some "short remarks on species of reptiles recently named and described—not with the object of correcting nomenclature, but rather with the view of inviting the authors of those species to reconsider the characters on which they have based them." As some of the remarks in question refer to species distinguished, though in no case originally described by myself, I took the first opportunity, after seeing Dr. Günther's paper, of reexamining the specimens on which my opinions had been founded. I have also examined some of the types described by the late Dr. Stoliczka. The result is that I am unable in some cases to agree with Dr. Günther; and in one case I think I can show that some mistake has been made. I will take Dr. Günther's identifications in the order in which they occur*.

1. CABRITA BRUNNEA.

Dr. Günther is, I believe, right in considering this the same as *C. leschenaulti*. In 1871 I collected many specimens of the former (which I had previously considered distinct), and I could find no difference except in the number of postnasals; and this depends on the circumstance that the lower nasal is sometimes united to the lower postnasal, sometimes separate. The same variation is occasionally met with in *Ophiops elegans*.

I found *Cabrita leschenaulti* common in the Godavery valley near Badrachellum; and I noticed that the very young which abounded in the month of April had always two postnasals, but that as they grew larger the lower postnasal appeared to become united to the lower nasal. It is possible (as I did not remain in one spot) that the distinction was local, and that the young Lizards in one place had two postnasals, in another one; but after the animals had grown rather larger I could find none with two postnasals, although those I found at first all had them. The head-scales in the very young animals are quite smooth.

2. OPHIOPS JERDONI, Blyth.

Dr. Günther unites with this *Cabrita jerdoni* of Beddome and myself, *Pseudophiops theobaldi*, Jerdon, and *Ophiops bivittatus* of Beddome. The last two identifications had already been made by Beddome (Madras Med. Journ. 1870) and by Stoliczka (J. A. S. B.

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* Dr. Günther has, I think, overlooked the circumstance that many of his identifications had been anticipated by the late Dr. Stoliczka (J. A. S. B. 1872, xli. pt. 2, pp. 86–135).

1872, p. 89). With regard to *Cabrita jerdoni*, it is probable that Dr. Günther and I have examined different Lizards. Although I thought it remarkable that I should have made so very clumsy a blunder as to mistake an *Ophiops* for a *Cabrita*, I carefully reexamined my original specimens of *C. jerdoni*, and found that they had the well-developed lower eyelids characteristic of the latter genus. On account of its transparency this lower eyelid is easily overlooked; but it is not likely that Dr. Günther has made a mistake of this kind; and as the British Museum possesses Col. Beddome's types, I should be inclined to conclude that I was in error in identifying the Lizard I obtained in the Godavery valley and elsewhere with *Cabrita jerdoni*, if it were not for Col. Beddome's original description of the species*. It is a subject of regret to every Indian herpetologist that Col. Beddome should have published descriptions of his numerous interesting discoveries in Southern India in a medical journal; and it is very possible that no copy of the work exists at the British Museum. I therefore copy the following paragraphs from the description in question:—

"*Cabrita jerdoni* (Bedd.). Two loreals, snout more pointed than in *C. leschenaulti*; .... *lower eyelid transparent*; .... femoral pores twelve on each thigh, &c.

"Only a single specimen of this interesting Lizard was procured, between Cotegal and Caverypooram. In its large scales it much resembles an *Ophiops, but has a distinct lower eyelid.*

"An *Ophiops*, which I take to be *O. jerdoni*, Blyth, is very abundant near the banks of the Tamboodra, north of Adoni, on red soil; and I have found the same species at Pothanore. It is very similar in colour to the *Cabrita* here described, and the scales of the back are similar in size; *it, however, wants the lower eyelid, and differs in the shields of the head, and has a much shorter tail, and only* 8–9 *femoral pores on each side.* A casual observer, however, might take the two to be the same species."

Now I think it is impossible to read the above paragraphs (the italics are my own) and to doubt that Colonel Beddome, when he wrote them, was well acquainted with the two species, *Ophiops jerdoni* and *Cabrita jerdoni*. I sent a specimen of the Lizard which I identified with the latter to Col. Beddome; and he assured me it agreed exactly with his type, as I mentioned in my paper, *l. s. c.* p. 348, note.

3. HEMIDACTYLUS COCTÆI.

Dr. Günther unites to this *H. bengaliensis*, Anderson (already shown to be identical by Stoliczka, *l. c.* p. 98), *H. giganteus*, Stoliczka, and *Doryura berdmorei* of Blyth and others.

It is very probable that the single specimen of *Hemidactylus giganteus* examined by Dr. Günther was a female, and that the tail was entirely renewed, in which case it could not easily be distinguished from *H. coctæi*. I have reexamined four specimens of *H. giganteus*—a pair (male and female) in the Indian Museum, and another similar pair which I had kept myself; and I agree with Dr. Stoliczka in considering it a distinct species. The two males have, one 18, the other 19 femoral pores in each thigh. In the two specimens retained as types of the species in the Indian Museum the basal portion of the tail appears not to have been renewed, and it is distinctly and regularly ringed. In one specimen especially, three rings remain which show no signs of ever having been renewed (the terminal portion of the tail is palpably a regrowth). In the other there are eight rings preserved at the base of the tail, but they are not so clearly of original growth. In neither of these specimens are there any enlarged tubercles on the tail.

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* Madras Monthly Journal of Medical Science, Jan. 1870, p. 34.

Dr. Stoliczka, who examined large numbers of specimens, never found more than eight femoral pores in each thigh in *H. coctæi.* In the Museum-specimens, which, however, are not numerous, I find five or six, whilst there is always an enlarged tubercle on each side of the tail on the posterior portion of each ring. The only specimens of this species I can find in the Museum are from Calcutta and Allahabad: they are labelled *H. bengaliensis,* Anderson. If Dr. Günther has specimens from other localities with more numerous femoral pores, it is to be hoped he will publish the fact.

So far as I can judge, *H. giganteus* comes nearer to *H. leschenaulti* than to *H. coctæi.* The former, as a rule, is distinguished by having tubercles on the back; but this is not always the case.

Nor can I agree in identifying *Hemidactylus berdmorei* (*Leiurus berdmorei,* Blyth; *Doryura berdmorei,* Theobald) with the young of *H. coctæi.* Blyth's type specimen is in the Museum here; and on comparing it with a specimen of *H. coctæi* of the same size, I find that the tail of *H. berdmorei,* which does not appear to have been reproduced, is quite smooth; whilst in that of *H. coctæi* the tubercles at the side, although small, are distinctly seen. The scales of the abdomen are a little larger in *H. berdmorei*; but the most characteristic distinction of the latter is in its very much smaller feet and toes, the latter being but little more than half the size of those of *H. coctæi.* The plates beneath the toes appear more numerous and broader in *H. coctæi*; but the type of *H. berdmorei* is not in good condition, and it is difficult to examine it closely. Lastly, Dr. Stoliczka has pointed out that in *D. berdmorei* there are from fourteen to sixteen pores in each thigh, whilst, as already mentioned, he never found more than eight in *H. coctæi.* It is true that the number of femoral pores varies in individuals with all Lizards; but still the amount of variation, so far as my experience goes, keeps within limits; and I think the distinction, that one species has habitually six to eight pores in each thigh, and another fourteen to sixteen, is probably sufficient to show that they are different forms.

I cannot find Dr. Stoliczka's specimens of *Hemidactylus berdmorei*: they do not appear to be in the Museum here.

Calcutta, May 12, 1876.

6. On the *Sterninæ*, or Terns, with Descriptions of three new Species. By Howard Saunders, F.L.S., F.Z.S.

[Received June 6, 1876.]

(Plate LXI.)

Having recently had opportunities of examining some interesting types of various real and supposed species of the subfamily *Sterninæ*, I propose to anticipate to a certain extent the monograph of the *Laridæ* upon which I have been for some time engaged, and to give the result of my observations in the following review of the species at present known to me, with general remarks upon their geographical distribution.

The principal writers who have hitherto treated of the *Sterninæ* are:—Prof. Schlegel, in the Mus. d'Hist. Nat. Pays-Bas, *Sternæ*, 1863; Prof. Blasius, in Journ. für Orn. 1866, p. 73; Dr. Elliott Coues, in Proc. Phil. Acad. 1862, and monographically, as regards the North-American species, in his 'Birds of the North West' 1874; and Messrs. Sclater and Salvin (Neotropical Laridæ, P. Z. S. 1871). And from the works of these able authors I have derived much assistance, especially from the last, owing to the care with which the synonymy and the geographical distribution have been worked out. Indeed as regards America I might well have been content to wait until the completion of my monograph; but as there are a good many species in other parts of the globe which have not been so recently noticed, there may be room for a few remarks.

It is almost needless to say that, owing to the general similarity in colour, the *Sterninæ* are a troublesome subfamily to handle, the question of what constitutes specific distinctness being here more than usually perplexing. The individual differences in size of bill, length of wing, &c. are often considerable; added to which there are subtile gradations in the various shades of plumage, which render it impossible to accord specific rank to forms which, when judged by their extremes alone, seem totally distinct. Under these circumstances it is not surprising that a species should sometimes be based upon what may appear at the first glance to be a very slight distinction; for the alternative is to unite under one head some forms which are clearly different; and considering the general tendency that there is towards blending, the systematist must be glad to avail himself of the smallest *permanent* characteristic. The young are often very much alike; and indeed in several cases they are as yet undistinguishable with the limited material at present available; but larger series of authentic specimens will doubtless clear up several points. The coloration of the soft parts presents considerable difficulties, owing to the changes which take place at different ages and seasons, it frequently happening that the bill and legs in quite young birds increase in intensity of colour up to a certain time in autumn, and then become dark, the brighter colour not being resumed until the following spring: this is notably the case with the Common and the Arctic Terns, in which the bills become dark very suddenly between the first and second weeks in October. At this season, too, the grey tint on the rump and tail-coverts which is also assumed by some species is apt to lead to confusion. Of the difficulties presented by the wearing-away of the grey frosty surface on the primaries, giving an abnormal appearance to their pattern, it is not necessary to say anything beyond drawing attention to their existence.

After careful examination of the representatives of all the genera into which this subfamily has been divided, I am unable to discover any satisfactory reasons for the adoption of more than five, viz. *Sterna, Hydrochelidon, Nænia, Gygis,* and *Anous.* It is true that in many forms there appears to be considerable departure from what we have been accustomed to consider typical *Sterna*; and this was especially evident to those systematists who treated principally of European or North-American species; but when the various species of the whole world are examined, so many connecting links and gradations will be found to exist, as to reduce the structural distinctions to a minimum, and to preclude the possibility of adopting with any degree of consistency several genera which at first glance seemed valid enough. For example, the Sooty Terns (*S. fuliginosa, S. anæstheta,* and *S. lunata*) have had no less than three genera erected for *one* of their number by Wagler alone, viz. *Onychoprion, Haliplana,* and *Planetis,* the definitions of which will hardly bear analysis; but even if any one of them were based upon genuine structural characters (which is not the case), there exists a far more important difference between the foot in *S. fuliginosa* and in that of *S. anæstheta,* than there is between *S. fuliginosa* and any typical *Sterna,* such as *S. fluviatilis.* It would strike any one as absurd to separate these two Sooty Terns generically, seeing that their resemblance is so close that for some time even their specific characteristics were by no means well known; yet, unless this is done, it is fully as inconsistent to separate them from true *Sternæ.* It is, however, unnecessary to say more upon this particular subject, as it will be noticed when treating of the species in question. The result of the mania which at one time prevailed for the manufacture of genera may be seen in the fact that whereas the members of the subfamily Sterninæ are about 50 in number, the genera erected for their reception are upwards of 30. It is true that many of these are merely vain repetitions of previously existing genera, the names of which did not happen to suit the fancy of the respective systematists, and that by discarding these synonyms the burden might be endured if the discrepancies of opinion as to the genera in which the various species should be located were not hopelessly irreconcilable, a single species being sometimes assigned to 7 or 8 different genera. Dismissing all but those which are based upon structural characters, independent investigations have led me to adopt substantially the genera accepted by the late G. R. Gray (Gen. Birds iii. p. 658), with the exception of *Phætusa,* which I put back under *Sterna*; whilst *Nænia,* which he puts with *Anous,* I consider valid; several species also which he assigned to *Hydrochelidon* are now restored to *Sterna.* Of the discarded genera even the best seem to be based upon the size and shape of the bill—a very variable character in Terns, and one which, when taken alone, does not seem to be of so much value in this family as in many others.

All things considered, the following arrangement of the various species seems to me to be the most natural; but, as is well known to all naturalists who have undertaken a similar task, it is impossible to attain to absolute consistency in locating the various members of a family in an ascending or descending scale; for the aberrant forms which frequently present themselves would destroy the best scheme that ever could be invented.

Genus HYDROCHELIDON, Boie.

This genus, originally instituted by Boie (Isis 1822, p. 563) for *H. nigra* and *H. leucoptera*, *H. hybrida* being left by him with *Sterna*, was, indeed, principally based upon coloration; but it has since been well defined and generally accepted as including the Marsh-Terns—of which the most characteristic distinctions are the short rounded tail, and the long slender toes connected by deeply incised webs. There is a general resemblance between the species which compose this very natural genus, the members of which agree in their habits, being gregarious at the breeding-season, and making their nests in the midst of marshy places. For convenience of treatment I commence with

HYDROCHELIDON HYBRIDA (Pall.).

Sterna hybrida, Pall. Zoogr. Rosso-As. ii. p. 338 (1811); Schlegel, Mus. P.-B. *Sternæ*, p. 33 (1863).

Sterna leucopareia, Natterer, in Temm. Man. d'Orn. p. 746 (1820).

Sterna javanica, Horsfield, Trans. Linn. S. xiii. p. 198 (1820) (type examined in E. I. Mus., *H. S.*); Gray & Hardw. Ill. Ind. Zool. i. pl. 70. fig. 1 (1832).

Sterna grisea, Horsfield, Trans. L. S. xiii. p. 199 (1820) (type examined in E. I. Mus., *H. S.*).

Viralva indica et *V. leucopareia*, Steph. in Shaw's Gen. Zool. xiii. p. 171 & 169 (1825).

Sterna delamottei, Vieillot, Faun. Fr. p. 402 (1828).

Pelodes leucopareia, Kaup, Nat. Syst. p. 107 (1829).

Sterna similis, Gray & Hardw. Ill. Ind. Zool. i. pl. 70, fig. 2 (1832) (type examined in E. I. Mus., *H. S.*).

Hydrochelidon fluviatilis, Gould, P. Z. S. 1842, p. 140; Gould, B. Australia, vii. pl. 31 (1848).

Hydrochelidon hybrida, G. R. Gray, Gen. B. iii. p. 660 (1846); Blas. J. f. Orn. 1866, p. 82; Degl. & Gerbe, Orn. Eur. ii. p. 468 (1867); Swinhoe, P. Z. S. 1871, p. 421 (Formosa).

Hydrochelidon delalandii, Bp. Compt. Rend. xlii. (1856), p. 773 (type examined, *H. S.*).

Hydrochelidon indica, Jerdon, B of India, iii. p. 837 (1864).

Hydrochelidon leucopareia, Gould, Handbook to B. Australia, ii. p. 406 (1865).

Sterna innotata, Beavan, Ibis, 1868, p. 404 (imm.).

Pelodes delalandii, Gray, Hand-list, iii. p. 122 (1871).

Pelodes indica et *P. fluviatilis*, Gray, Hand-list, iii. pp. 121, 122 (1871).

Gelochelidon innotata, Gray, Hand-list, iii. p. 119 (1871).

Pelodes hybrida, Gurney, Andersson's B. of Damaraland, p. 362 (1872); Gray, Hand-list, iii. p. 121 (1871).

"*Sterna leucoptera*" (in error), Buckley, Ibis, 1874, p. 391 (Transvaal).

After examining a very large series, I am unable to detect any constant difference between European, Indian, and Australian specimens. Examples in breeding-plumage are absolutely identical; and it is much if a trifling inferiority in size can be remarked in the Indian, and a slightly paler tint in the coloration of the upper parts of Australian examples. The general range of the species may therefore be described as from the extreme west of Europe to the coasts of China and the island of Formosa and throughout the Malayan region down to Australia, principally the Queensland portion. It occurs in South Africa abundantly in winter, and probably breeds there, as Andersson obtained it in full plumage in April. In the British Museum there is a mounted specimen marked as obtained at Barbadoes and presented by Sir Robert Schomburgk, who was for some time Governor of that West-Indian colony; but there does not appear to be any other record of its occurrence so far west, even as a straggler.

HYDROCHELIDON LEUCOPTERA, Meisn. & Schinz.

Sterna fissipes et *S. nævia*, Pallas, Zoogr. Rosso-As. ii. pp. 337–8 (1811), nec Linn.

Sterna leucoptera, Meisner & Schinz, Vög. Schweiz, p. 264 (1815); Temm. Man. d'Orn. p. 483 (1815).

Hydrochelidon leucoptera, Boie, Isis, 1822, p. 563; Buller, B. New Zealand, p. 287 (1873); Dresser, B. of Europe, pt. xlv. (Nov. 1875).

Viralva leucoptera, Steph. in Shaw's Gen. Zool. xiii. p. 170 (1826).

Hydrochelidon leucopterum, Bp. Comp. List, p. 61 (1838).

Hydrochelidon nigra, G. R. Gray, Gen. Birds, iii. p. 660 (nec Linn.) (1849); Blas. J. f. Orn. 1866, p. 82; Swinhoe, Ibis, 1863, p. 97, P. Z. S. 1863, p. 28, P. Z. S. 1871, p. 421 (China); Gurney, Andersson's B. Damara-land, p. 363 (1872); G. R. Gray, Hand-list, iii. p. 121 (1871); Coues, B. N.W. America, p. 709 (1874).

Hydrochelidon subleucoptera, C. L. Brehm, Vogelfang, p. 350 (1855).

Hydrochelidon javanica, Swinhoe, Ibis, 1860, p. 68, 1861, p. 345 (nec Horsfield).

Sterna nigra, Schlegel. M. P.-B. *Sternæ*, p. 31 (1863).

Hydrochelidon niger, Severtzoff, Turk. Jevotnie, p. 70 (1873), fide Dresser.

The description of this species was given by Meisner and Schinz, and also by Temminck, under date of the same year; the former, however, give a coloured plate, and their claim to the earliest discrimination of its distinctness seems to be generally acknowledged. It is to be regretted that Mr. G. R. Gray and others should subsequently have identified it with *Sterna nigra* of Linnæus, for which there does not appear to have been any reasonable ground; for, as I trust to show when treating of the Black Tern, Linnæus's description can only apply to that species.

By its longer and more slender toes and claws, and deeply incised webs, this species may be distinguished from *H. nigra* at all ages; whilst its generally smaller dimensions serve to separate the young from that of *H. hybrida*. In the immature plumage also the upper tail-coverts are whiter than in *H. nigra*, in which the grey of the back continues over the rump and throughout the tail; but the above white band is somewhat dependent upon the make of the skin, and is not an unfailing guide with such specimens as the one Mr. J. H. Gurney had before him (which is now in my collection) when he identified it as *Sterna fissipes*. On raising the feathers on the rump, however, it will be seen that there is much more white at the base of those of *H. leucoptera* than in those of *H. nigra*; and in properly preserved skins the white band on the rump is clearly defined even in very young birds. The adults in summer can hardly be mistaken even on the wing, the *black* under wing-coverts being very conspicuous, (whereas in *H. nigra* they are *pale grey*); in winter and immature plumage the under wing-coverts are *white*.

A straggler to northern Europe, this Tern becomes abundant in the south and south-east, ranges throughout Siberia and China, and reaches to the Transvaal and Damaraland and to Abyssinia, whence I have several specimens, all in immature plumage; there is, however, little doubt that it breeds there. It has also been obtained in Australia and New Zealand, and is recorded by Dr. E. Coues as having been captured in Wisconsin, U. S., on 5th July 1873, in full breeding-plumage.

HYDROCHELIDON NIGRA (Linn.).

Sterna nigra, Linn. S. N. i. p. 227 (1766), F. S. p. 159; Meyer & Wolf, Tasch. Deutsch. Vög. ii. p. 461 (1810); Temm. M. d'Orn. p. 484 (1815).

Sterna nævia, Linn. S. N. i. p. 228 (1766), ex Brisson (jr.).

Sterna fissipes, Linn. S. N. i. p. 228 (1766); Schlegel, Mus. P.-B. *Sternæ*, p. 29 (1863).

Larus merulinus, Scop. Ann. i. Hist. Nat. p. 81 (1769).

Sterna surinamensis, Gm. S. N. i. p. 604 (1788).

Sterna plumbea, Wilson, Am. Orn. vii. p. 83, pl. 60 (1813).

Hydrochelidon nigra, Boie, Isis, 1822, p. 563.

Viralva nigra, Steph. in Shaw's Gen. Zool. xiii. p. 167 (1824).

Anous plumbea, Stephens, in Shaw's Gen. Zool. xiii. pt. i. p. 142 (1826); (ex Wilson).

Hydrochelidon fissipes, G. R. Gray, Gen. Birds, iii. p. 660 (1849); Blas. J. f. Orn. 1866, p. 82; Degl. & G. Orn. Eur. ii. p. 465 (1867);

Scl. & Salvin, P. Z. S. 1871, p. 573; Coues, Proc. Phil. Acad. (1862), p. 554; G. R. Gray, Hand-list, iii. p. 121 (1871).

Hydrochelidon plumbea, Lawr. B. N. Am. p. 864 (1858); et al. auct. Am.

Pelodes surinamensis, Gray, Hand-list, iii. p. 122 (1871).

Hydrochelidon lariformis, Coues, B. N.W. Am. p. 704 (1874).

"*Sterna cæsia*, Linn." Gundlach, J. f. Orn. 1875, p. 393, (? error for *S. nævia*).

Sterna nigra of Linnæus (Syst. Nat. p. 227, 1766) is based upon his *Sterna* 159 of the 'Fauna Suecica' ed. 1761, in which he accurately describes the Black Tern, adding that "it is found on the small reedy islands about Upsala." This can only refer to the present species, as the White-winged Black Tern is one of the rarest of stragglers to any part of Sweden. Linnæus also refers to Albin's plate and description, Av. ii. p. 82, pls. 89 & 90, which are unmistakable. There is therefore no warranty whatever for identifying his *S. nigra* with the south-eastern species. I have gone carefully into the question; and any one who is willing to take the trouble of examining the matter for himself will, I have no doubt, share my opinion.

In almost all the adult American specimens which I have examined, about a dozen in number, the black of the underparts is of a deeper and more sooty brown tint than in any European examples out of upwards of a hundred from various localities, the black being as dark as in *H. leucoptera*, an intensity of hue which our form never possesses. In two or three examples, however, all females, the lightest-coloured American birds approach more closely to very dark specimens from Europe; and in the young and winter plumage the two forms are absolutely undistinguishable; so that any specific separation is out of the question. This species is found throughout Europe, Palestine, and N. Africa to the Nile; to S. Africa it appears to go only as a winter and somewhat rare visitant, as I only know of one example, obtained 4th Jan. 1871 at the Cameroons (the birds collected by Mr. Ayres and others being *H. leucoptera* in immature plumage); nor do I know of its occurrence in India. In America it ranges throughout and across the northern continent, visiting the West Indies and Spanish main on the one side, and going as far south as Peru and Chili on the Pacific coast in winter.

Genus STERNA, Linn. (part).

STERNA MAGNIROSTRIS, Licht.

Sterna magnirostris, Licht. Verzeichniss Doubl. p. 81 (1823) (type in Berlin Mus.; examined, *H. S.*); Max. v. Wied, Beit. iv. p. 861 (1833); Tschudi, F. Per. Aves, p. 305 (1846); Schlegel, Mus. P.-Bas, *Sternæ*, p. 12 (1863).

"*Sterna speculifera*, Temm.," Lesson, T. d'Orn. p. 622 (1831); Pucheran, Rev. Zool. 1850, p. 544.

"*Sterna albifrons*, Cuv.," Lesson, Tr. d'Orn. p. 622 (1831) (sp. in Paris Mus. examined, *H. S.*).

Phaëtusa magnirostris, Wagler, Isis, 1832, p. 1224 (type of genus *Phaëtusa*); Scl. & Salvin, P. Z. S. 1871, p. 567; Gray, Hand-list, iii. p. 120 (1871).

Sylochelidon magnirostris, Blasius, J. f. Orn. 1866, p. 82.

This large-billed Tern with a slightly forked tail, but with amply webbed feet, is found far up the great rivers and along the coasts of tropical America from the equator down to about 35° S. Its eggs, which are deposited on the sandbanks, are similar in character to those of *S. anglica*; and taking all its characters into consideration, without relying only on the shape of the bill, it is difficult to allow its generic distinction without admitting a host of other and confusing genera.

STERNA ANGLICA, Mont.

Sterna anglica, Mont. Orn. Dict. Suppl. (1813) (type in Brit. Mus.); Schlegel, Mus. P.-Bas, *Sternæ*, p. 34 (1863); Degl. & Gerbe, Orn. Eur. ii. p. 450 (1867).

Sterna aranea, Wilson, Am. Orn. viii. p. 143, pl. 72. fig. 6 (1814).

Sterna affinis, Horsfield, Trans. Linn. Soc. 1820, xiii. p. 199 (type examined in E. I. Mus., *H. S.*).

Thalasseus anglicus, Boie, Isis, 1822, p. 563.

Viralva anglica, Steph. in Shaw's Gen. Zool. xiii. pt. i. p. 174 (1826).

Gelochelidon balthica, Brehm, H. Vög. Deutsch. p. 772 (1831).

Gelochelidon meridionalis, Brehm. H. Vög. Deutsch. p. 774 (1831) type of genus *Gelochelidon*.

Laropis anglica, Wagler, Isis, 1832, p. 1225 (type of *Laropis*).

Sterna macrotarsa, Gould, P. Z. S. 1837, p. 26.

Gelochelidon anglica, Coues, Proc. Phil. Ac. 1862, p. 536; Jerdon, B. India, iii. p. 836 (1864); Blasius, J. f. Orn. 1866, p. 82; Scl. & Salvin, P. Z. S. 1871, p. 572; Coues, B. N.W. Am. p. 664 (1874).

Gelochelidon macrotarsa, Gould, B. Austr. Suppl. pl. 81 (1869), Handbk. B. Austr. ii. p. 403 (1865); Gray, Hand-list, iii. p. 119 (1871).

Gelochelidon nilotica, Gray, Hand-list, iii. p. 119 (1871).

Gelochelidon aranea, Gray, Hand-list, iii. p. 119 (1871).

In this case also, in spite of its stout bill, the short and somewhat rounded lateral feathers of the tail, and the long hind toe, I do not think we can consistently allow a generic distinction without admitting a number of indifferent genera. In its habits this bird appears to partake rather of the nature of the Sea-, than of the Marsh- or River-Terns, and although the shape of the tail is somewhat rounded as in *Hydrochelidon*, it must be remembered that *S. caspia* has a similar tail, and that both these species have the strong and fully webbed feet of the Sea-Terns. On the whole it would seem advisable to avoid undue multiplication of genera by retaining this species amongst the *Sternæ*.

It is now generally admitted that the American *S. aranea* is identical with the European bird; and I can see no ground for considering Mr. Gould's *Sterna macrotarsa* from Australia to be specifically distinct. The range of the species is therefore from

Western Europe to the China seas, throughout India, Ceylon, and the Malay region down to Australia, and along the east coast of America as far as Patagonia; on the Pacific side it has only been observed in Guatemala (Salvin). It does not appear to have been recorded from South Africa, which is somewhat remarkable.

Mr. G. R. Gray chose to identify this species with Hasselquist's *S. nilotica*; but there is nothing in his description to prove that this was the bird referred to; and in any case the name would not be available, as it antedates the 12th ed. of Linnæus's 'Systema Naturæ.'

STERNA SEENA, Sykes.

Sterna seena, Sykes, P. Z. S. 1832, ii. p. 171. no. 231.

Sterna aurantia, Gray & Hardw. Ill. Ind. Zool. i. pl. 69. fig. 2 (1832).

Sterna brevirostris, Gray & Hardw. Ill. Ind. Zool. i. pl. 69. fig. 1. juv. (1832).

Sterna roseata, Hodgson, Gray's Zool. Misc. p. 86 (1844).

Seena aurantia, Blyth, Cat. Birds Mus. As. S. B. p. 291. no. 1706 (1849) (type of subgenus *Seena*); Jerdon, B. India, iii. p. 838 (1864); Blasius, J. f. Orn. 1866, p. 73.

Although the stout curved bill of this species is somewhat peculiar, this seems to be hardly sufficient to warrant its elevation to the rank of a subgenus. The webs of the toes are of moderate extent and not much excised; the tail is *long* and *forked*, as in typical *Sterna*.

This Tern breeds on the sandbanks of the Indian rivers; and the eggs are in appearance intermediate between those of *S. anglica* and the large-billed River-Tern of South America, *S. magnirostris*. It appears to be confined to the Indian region.

The names *seena* and *aurantia* are contemporaneous; but I adopt the former, because it is properly described; *S. aurantia* is undescribed, and merely based upon a bad plate.

STERNA MELANOGASTRA, Temm.

Sterna melanogaster (sic), Temm. Pl. Col. vol. v. pl. 434 (1838); Gould, B. Asia, pt. xix. pl. (1867).

Sterna javanica, Horsfield, in Zool. Res. (but not in Tr. Linn. Soc. 1820, xiii.); Jerdon, B. India, iii. p. 840 (1864); Irby, Ibis, 1861, p. 247.

Sterna acuticauda, Gray & Hardw. Ill. Ind. Zool. pl. 70. fig. 3 (1832).

Sterna melanogastra, Schlegel, Mus. P.-B. *Sternæ*, p. 21 (1863); Schl. & Poll. Rech. Madagasc. p. 147 (1868).

Hydrochelidon melanogastra, Bonap.

Sternula melanogastra, Blas. J. f. Orn. 1866, p. 74.

"*Sternula minuta*" et "*Sternula jerdoni*," Beavan, Ibis, 1868, p. 403 (clearly immature birds of this species).

Pelodes javanica, Gray, Hand-l. iii. p. 122 (1871).

Owing to its somewhat excised webs, and perhaps to its superficial resemblance in the dark coloration of the lower parts to *H. hybrida,* this species has been placed by Bonaparte and others in the genus *Hydrochelidon*; but its long, straight bill, and long, pointed tail show that its position is rather with the true *Sternæ.* It is an abundant species on most of the Indian rivers, in Ceylon, Burma, &c.; and in its manner of nesting on sandbanks, and in the character of its eggs, of which I have specimens before me, it differs from the Marsh-Terns.

As this species is constantly cited as "*Sterna javanica,* Horsfield," I may be excused for repeating that I have examined Horsfield's *type* specimen of "*Sterna javanica*" in the Indian Museum, and that it is undoubtedly *Hydrochelidon hybrida* (Pallas). As a straggler *S. melanogastra* has occurred during a tempest at the Island of Réunion.

STERNA ANTARCTICA, Wagler.

Sterna antarctica, Wagler, Isis, 1832, p. 1223 (ex J. R. Forster, MS.); J. R. Forster, Desc. Anim. p. 107 (ed. 1844); Buller, B. New Zealand, p. 283 (1873).

Hydrochelidon albostriata, G. R. Gray, Voy. Erebus & Terror, Birds, p. 19, pl. 21 (1844).

Sternula antarctica, Bonap. C. R. xlii. p. 773 (1856).

Hydrochelidon albistriata, Bonap. C. R. xlii. p. 773 (1856).

Sterna cinerea, Ellman, Zoologist, 1861, p. 7473.

Hydrochelidon hybrida, Finsch, J. f. O. 1867, p. 347.

Pelodes albistriata, Gray, Hand-list, iii. p. 122 (1871).

This species, of a nearly uniform smoke-grey colour, appears to be confined to New Zealand, and principally to the South Island, where it deposits its eggs on the bare ground, making no nest, and having in general the habits of a coast- or estuary-frequenting Tern. The foot is moderately stout, and the webs are but slightly scalloped; the upper mandible, which is slightly curved towards the tip, is quite different from that of *Hydrochelidon,* in which genus there seems to be no good reason for placing it. It is closely allied to the next species—a somewhat specialized form, found only, up to the present time, at Kerguelen Island.

STERNA VIRGATA, Cab.

Sterna virgata, Cabanis, J. f. Orn. 1875, p. 449.

"*Sterna vittata,* Gm.," Coues, in Bull. U.S. Nat. Mus. p. 17, 1875 (nec Gm. nec Von Pelzeln).

There are three specimens of this Tern in the British Museum, all from Kerguelen Island: two are in immature plumage; and one is a fine adult. The bill is rich blood-red, and the feet are red, whereas in *S. antarctica* those parts are yellow, or, at most, orange; the bill, also, in the Kerguelen bird is much straighter than in the New-Zealand form; and the tail is more deeply forked. It is, in fact, a more thoroughly Sea-Tern than its predecessor; in its nesting it is also peculiar, the *single* egg being deposited upon somewhat high and broken ground and on the slope of the hill-side (*Kidder*).

The egg is of the ordinary Tern-like character, with a trifle more olive-green in the ground-colour than is usual in eggs of *S. fluviatilis*, but which is not rare in a series of those of *S. macrura*. Dr. Kidder, Naturalist to the American Expedition to observe the Transit of Venus, describes the birds as very bold, swooping at the head of any one who approaches their breeding-grounds, and actually scaring the Skuas by their impetuous attacks. There can be no doubt that this was the species obtained by the Americans; but Dr. Coues is mistaken in identifying it with *S. vittata*, Gm., of which he can hardly have examined a genuine specimen, or he would never have confounded two such perfectly distinct species.

STERNA VITTATA, Gm.

Sterna vittata, Gm. S. Nat. i. p. 609 (1788) (founded on Latham's Wreathed Tern, from Christmas Island); Pelzeln, Novara-Reise, Vögel, p. 152 (1865) (full description).

Gmelin's description, founded on Latham, fairly suits this species, although I am inclined to doubt the correctness of the locality assigned, viz. Christmas Island, especially as there is no mention in Cook's Voyages of any Tern being found there, except the Sooty Tern, of which there is a full description. However, it has not been applied to any other bird; and in the Ornithology of the 'Voyage of the Novara,' Herr von Pelzeln adopted the name for the present species, obtained at St. Paul's Island, about 700 miles to the north of Kerguelen Island, giving a full description, both in Latin and German; so that the name may fairly be accepted. The British Museum possesses both adult (in breeding-plumage) and immature specimens obtained at St. Paul's Island in January 1853, and also a specimen from Kerguelen Island; there is another, taken on board H.M.S. 'Rattlesnake,' in 38° 22′ S., 0° 25′ W., on 27th February 1847; and I have a specimen, also captured on board ship, near the island of St. Helena, in April, for which I am indebted to my friend Mr. E. Hargitt. In general appearance this Tern much resembles *S. hirundinacea*, Lesson (*S. cassini*, Scl.); but it is decidedly smaller, and more generally washed with grey below; the bill, which is red, is rather weak, and tapers very suddenly from the angle to the tip. In the adult the tail is long, forked, and very white. It is interesting to find a species which apparently has its head quarters at St. Paul's Island, reaching down on the one hand to Kerguelen Island, where it meets with another species closely allied to *S. antarctica* of New Zealand, and then stretching away to the west of our meridian and approaching the limits of the South-American species, with which its affinities are undoubtedly strongest, and thus connecting South America with New Zealand by way of the islands of the South Atlantic Ocean.

STERNA HIRUNDINACEA, Less.

Sterna hirundinacea, Lesson, Tr. d'Orn. p. 621 (1831); Pucheran, Rev. Zool. 1850, p. 539 (Santa Catharina, Brazil; type in Paris Mus. examined, *H. S.*).

Sterna hirundo, Max. v. W. Beitr. iv. p. 865 (1833).

Sterna antarctica, Peale (nec Lesson, nec Wagler, nec Forst.), U.S. Expl. Exp. p. 280 (1848); Ph. & Landbeck, Cat. Av. Chilenas, p. 49.

Sterna meridionalis, Cassin (nec Brehm), U.S. Expl. Exp. p. 385 (1858); Schlegel, Mus. P.-B. *Sternæ*, p. 15 (1863).

Sterna wilsoni, Burm. Syst. Ueb. iii. p. 451.

Sterna cassinii, Sclater, P. Z. S. 1860, p. 391; Abbott, Ibis, 1861, p. 166; v. Pelzeln, Novara-Reise, Vög. p. 153 (1865); Scl. & Salv. P. Z. S. 1871, p. 570; Gray, Hand-l. iii. p. 118 (1871).

"*Sterna meridionalis*, Peale," Blasius, J. f. Orn. 1866, p. 74 (nec Peale).

The range of this species, as defined by Messrs. Sclater and Salvin, is from Rio de Janeiro southwards to the Falkland Islands, and up the west coast of Chili as far north as Valdivia. Since then I have received specimens from Colchagua, in about 35° S. lat.; and it may naturally be looked for even further north. It is the largest and the lightest in colour of the medium-sized Sea-Terns; and the entire bill (which is long and powerful) is bright red in the adult.

It is with regret that I do not adopt Mr. Sclater's name *S. cassinii*; but the examination of the type of *S. hirundinacea* shows that it is undoubtedly this species.

STERNA ALBIGENA, Reich.

Sterna albigena, Licht. Nomenclator, 1854 (descr. nulla); Reich. Schwimmvög. Suppl. xi. pl. xxi. fig. 816.

Hydrochelidon albigena, Bonap. Compt. Rend. 1856, ii. p. 773.

"*Sterna senegalensis*, Sw.," Heugl. Ibis, 1859, p. 351; König-Warth. Ibis, 1860, pp. 125, 432.

Sterna albigena, Heugl. Faun. Roth. Meeres, no. 307, p. 32 (descr.); Schlegel. Mus. P.-B. *Sternæ*, p. 20 (1863); Blasius, Journ. f. Ornith. 1866, p. 75; Finsch & Hartl. Vög. Ost-Afr. iv. p. 834, tab. x. fig. 2 (1870).

Pelodes albigena, Gray, Hand-list, iii. p. 122 (1871).

In order to show the connexion between the three preceding species, it was necessary to pass over the present, which is a local and smoke-coloured form of typical *Sterna*, having no real affinity with *Hydrochelidon*. The tail is long and pointed, the bill narrow and straight; the feet are amply webbed; and it is, in a word, a small, slender, Common Tern, of a general smoky hue, the rump and tail being as dark as the mantle. I cannot understand how Finsch and Hartlaub fail to identify Reichenbach's figure in the 'Schwimmvögel' with this species; for his illustration, though coarse, is decidedly far more recognizable than theirs in the 'Vög. Ost-Afrika's.' It is a very distinct form, which appears to have its head quarters in the Red Sea, south of the tropic of Cancer; and an interesting account of its breeding in the Dahalak archipelago is to be found in 'The Ibis,' 1861, p. 125. The eggs, two in number, are laid in July and August, on the flat coral reef, close to the beach, and resemble those of typical *Sterna*. Whilst writing this, Lord Walden has sent me two fine specimens, obtained near Bombay, a considerable extension of its range as hitherto known to us. There is no example of this Tern in the British Museum; but the collections at Leyden, Frankfort, Mayence, and Berlin are more fortunate in this respect.

STERNA FLUVIATILIS, Naum.

Sterna hirundo (in part), Linn. Syst. Nat. i. p. 227 (1766), and of most authors.

Larus bicolor, Larus sterna et *Larus columbinus*, Scop. Ann. i. Hist. Nat. p. 82, 1769 (nos. 110 & 112 im., 113 juv.).

Sterna fluviatilis, Naum. Isis, 1819, p. 1847–48; Gray, Hand-list, iii. p. 118 (1871); Sharpe & Dresser, B. Europe, pt. xi. (1872).

Sterna senegalensis, Sw. B. W. Af. ii. p. 250 (1837); Schl. Mus. P.-Bas, *Sternæ*, pp. 16 & 17 (1863) (sp. no. 2 examined by *H.S.*).

Sterna wilsoni, Bp. List, p. 61 (1838), et auct. American.; Gray, Hand-list, iii. p. 118 (1871).

Sterna macrodactyla et *macroptera*, Blasius, J. f. Orn. 1866, pp. 75, 76; Gray, Hand-list, iii. p. 118 (1871).

Sterna dougalli, Layard, B. S. Af. p. 369 (1867).

This well-known species is found throughout Temperate Europe, Asia, and America, except on the Pacific coast. In winter it visits the coast of Africa as far south as the Cape of Good Hope, and has occurred as far to the south-east as Ceylon, specimens having been sent to me by Capt. Vincent Legge, R.A. Northwards it goes as far as Pekin (*Swinhoe*); but in Tibet and part of Siberia it is replaced by a form which I consider to be distinct, and for which I propose the name of

STERNA TIBETANA, sp. nov.

S. *similis* S. fluviatili *sed ubique saturatior; supra schistaceo-cinerea; subtus pectore clare vinaceo facile distinguenda.* (From a specimen in Lord Walden's collection.)

Four adult specimens from Tibet and several from Lake Baikal ascribed to *S. longipennis* differ from the latter in having the bill and feet coloured as in *S. fluviatilis*, from which in turn they differ in having the sides of the neck, shoulders, and flanks of a clear grey, which assumes a darker and more vinous tint on the breast and abdomen; the mantle and wings are also much darker. The bill and feet are smaller than in average *S. fluviatilis*, and of an orange-red, the former tipped with horn. It is possibly this species which Mr. Hume mentions as breeding near Yarkand. The examples referred to above are all in breeding-plumage; but I believe *S. fluviatilis* is a rare bird even in Lower India, and only found there during the winter months.

STERNA LONGIPENNIS, Nordm.

Sterna longipennis, Nordm. in Erman's Verz. v. Th. u. Pfl. p. 17 (1835); Middendorff, Reise, Zool. p. 246, tab. 25. fig. 4 (1851); Schlegel, Mus. P.-B. *Sternæ*, p. 23 (1863) (as regards

Middendorff's specimens only, *H. S.*); Blas. J. f. Orn. 1866, p. 59; Gray, Hand-list, iii. p. 118 (1871).

In its slender shape and grey-tinted underparts this species seems to connect the preceding with *S. macrura*; the *feet*, however, are *brown*; and the *bill* is *black* in the breeding-season, and probably at other times. But authentic specimens in immature plumage are still desiderata, although I can refer to no other species a specimen obtained by Mr. Wallace in New Guinea. Lord Walden's collection contains a specimen from Yeso, the most northern of the Japanese islands; and thence it reaches as far west as Lake Baikal, where, as before observed, *S. tibetana* is also found; indeed many of the specimens sold by the Paris dealers as *S. longipennis* are really the latter species.

STERNA MACRURA, Naum.

Sterna hirundo (in part), Linn. Syst. Nat. p. 227 (1766), id. F. S. p. 55. no. 158; Gray, Hand-list, iii. p. 118 (1871); Sharpe & Dresser, B. Europe, xii. (1872).

Sterna macrura, Naum. Isis, 1819, p. 1847; Coues, P. Phil. Acad. 1862, p. 549; id. B. N.W. Am. p. 685 (1874).

Sterna arctica, Temm. Man. d'Orn. ii. p. 742 (1820).

Sterna brachypus, Swainson, B. W. Afr. ii. p. 152 (1837); Gray, Hand-list, iii. p. 118 (1871).

Sterna pikei, Lawr. Ann. Lyc. N. Y. vi. p. 3 (1853); id. Baird's B. N. Am. p. 853, pl. 95 (1858); Gray, Hand-list, iii. p. 118 (1871).

Sterna paradisea, Brünn., Schlegel, Mus. P.-B. *Sternæ,* p. 15 (1863); Blas. J. f. Orn. 1866, p. 74.

"*Sterna senegalensis,* Sw.," Schlegel, Mus. P.-B. *Sternæ,* p. 16 (1863) (no. 1 sp. examined, *H. S.*).

Sterna portlandica, Ridg. Am. Nat. viii. p. 433 (1874); Coues, B. N.W. Am. p. 691 (1874). (Other unimportant synonyms are intentionally omitted).

It is true that the mere description of *Sterna hirundo* given by Linnæus suits the Arctic Tern as regards the colour of the bill, which is properly described as "rubrum," and as "coccineum" in the 'Faun. Suec.,' whereas in the Common Tern the red bill is somewhat tipped with horn-colour. In the references to former authors and in the context, especially where he says "habitat ubique ad lacus et stagna," there is, on the other hand, a stronger probability of Linnæus's bird being the Common Tern, a species abundant in Sweden, and which is far more in the habit of frequenting inland waters than the Arctic Tern. Since the time when the two species were discriminated, first by Naumann, and in the following year by Temminck, the names of *S. macrura* and *S. arctica* have been generally adopted for the Arctic Tern, the latter being, perhaps, the more widely recognized, until the late Mr. G. R. Gray, and afterwards Messrs. Sharpe and Dresser, in one of the early Parts of the 'Birds of Europe,' on which they were then jointly engaged, considered it advisable to shift the time-sanctioned name of *S. hirundo* from the Common to the Arctic Tern. There could be no objection to their discarding *S. hirundo* for the former and adopting *S. fluviatilis*; but these violent transfers must always be productive of confusion even when justifiable; and in this case it seems to me that the original description is so ambiguous that they would have done better to discard *S. hirundo* altogether, and to adopt the first name about which there could be no mistake—a step which, much as I dislike to differ from such high authorities upon nomenclature, I feel compelled to take.

This species is the *S. paradisea* of Brünnich (Orn. Bor. p. 42 (1764)—a pre-Linnæan name, which is not available. I notice it, however, because this name has frequently been employed for the Roseate Tern (*S. dougalli*), a bird with which Brünnich was unacquainted. From the plate and description I always imagined that *S. pikei* was an immature bird of this species, and am glad to have this opinion confirmed by Dr. Elliott Coues, who has lately reexamined the type.

With regard to *S. portlandica*, Mr. W. Brewer's investigations and the latest information from American sources leave little doubt that it is only an immature example of this species.

The Arctic Tern ranges along the coasts of northern Europe, Asia, and America; in winter it visits the African coast, descending as far as Walwich Bay; and I have an example obtained by Wucherer off Bahia, the only instance known of its occurrence so far south on the American side; it is possible, however, that the bird mentioned by Philippi and Landbeck, Cat. Av. Chilenas, 49 (1869), may be this species.

STERNA FORSTERI, Nutt.

Sterna hirundo, Sw. & Rich. F. Bor.-Am. p. 412 (1831), nec auct. (Saskatchewan River).

Sterna forsteri, Nuttall, Man. Orn. ii. p. 274, note (1834); Lawr. B. N. Am. p. 862 (1858); Coues, P. Phil. Acad. 1862, p. 544; Blas. J. f. Orn. 1866, p. 74; Scl. & Salv. P. Z. S. 1871, p. 569; Gray, Hand-list, iii. p. 118 (1871); Coues, B. N.W. Am. p. 676 (1874).

Sterna havelli, Aud. Orn. Biog. v. (1839) p. 122, pl. 409. fig. 1, and of Lawr. &c. (*fide* Coues); Gray, Hand-list, iii. p. 118 (1871).

A rather stouter and larger species than *S. fluviatilis*, this species may always be distinguished by its having the *outer* webs of the long tail-streamers *white*, whereas in the allied species they are dusky. In the 'Birds of the North West' (*l. s. c.*) Dr. Coues gives the differential diagnoses of *S. forsteri*, *fluviatilis*, and *macrura*; and to these I have nothing to add.

In summer this Tern breeds in the interior of British America and in Wisconsin; but at other seasons it is generally distributed throughout the United States, and goes down as far as Guatemala, on both the Pacific and Atlantic side, and even to the latitude of Pernambuco, Brazil, thus nearly impinging upon the northern limits of *S. trudeaui*, a species to which, in *winter* plumage only, it bears a superficial resemblance.

STERNA DOUGALLI, Mont.

Sterna dougalli, Mont. Orn. Dict. Suppl. (1813); Vieillot, N. D. H. N. xxxii. p. 174 (1819), Gal. Ois. ii. p. 225; Steph. in Shaw's Gen. Zool. xiii. pt. i. p. 153 (1825); Scl. & Salv. P. Z. S. 1871, p. 571; Coues, B. N.W. Am. p. 688 (1874).

Sterna paradisea, Keys. & Blas. Wirb. Eur. p. 247. no. 484 (1840) (nec Brünn.); Lawr. B. N. Am. p. 863 (1858); Coues, Proc. Phil. Acad. 1862, p. 551; Gray, Hand-list, iii. p. 119 (1871); Walden, Ibis, 1874, p. 149 (Andaman Is.).

Sterna gracilis, Gould, P. Z. S. 1847, p. 222, B. Australia, vii. pl. 27 (1848), Handbook B. Austr. ii. p. 399 (1865); Gray, Hand-list, iii. p. 119 (1871).

"*Sterna douglasii*, Mont.," Schlegel, Mus. P.-B. *Sternæ*, p. 24 (1863).

"*Sterna douglasi*, Mont.," Blasius, J. f. Orn. 1866, p. 80.

? *Larus polo-candor*, Sparrm. Mus. Carl. ii. fasc. 4, no. 83 (1788). ("Habitat ins. Polo-candor, mari Chinensi.") The plate represents a very young Tern, apparently of this species. Bonaparte says (in his "Notes sur les Larides," in the Rev. et M. de Zool, 1854) that he has *proved* it to be a young *Rissa*! but any thing more unlike a Kittiwake it would be difficult to imagine.

Apart from its light and elegant shape and its proportionally short wings, this species may always be recognized by the white inner margins of the primaries, extending quite round the tips of the feathers as far as the outer webs; the rump and tail-coverts are washed with gray. The coloration of the bill varies considerably with age and seasons; in some specimens it is black almost to the base, whilst in others the red or orange extends far in front of the angle. In American specimens the bill is, perhaps, a trifle stouter than in British examples, which are in this respect identical with birds from Africa and the Indian Islands. In these the red colour gradually encroaches upon the black, until, in two specimens from the Andaman Islands, in Lord Walden's collection, the black at the tip of the bill has almost disappeared, in which state it becomes the *S. gracilis* of Mr. Gould, whose typical specimen in the British Museum is in *every* other respect identical with *S. dougalli* from any part of the world; indeed, in his original description (in P. Z. S. 1847, p. 222) Mr. Gould calls it "a very elegant species, closely allied to *S. dougallii* of the British Islands," although he omits that remark in the 'Birds of Australia.' In view of these gradual changes in the amount of black in the bill, as exemplified by a series of upwards of fifty specimens from various localities, I must consider *S. gracilis* merely a form of *S. dougalli* with more red in its bill than is usual in northern specimens.

I do not find authentic records of the occurrence of this bird beyond 57° N. lat., south of which it ranges in scanty numbers along the British and European coasts, and goes up the Mediterranean at least as far as the Balearic Islands, whence Canon Tristram possesses an adult obtained in May. I have not seen any specimens from the west coast of Africa, all those so marked from Damaraland being really *S. fluviatilis* in winter dress; but there are specimens in the British Museum from the Cape of Good Hope, and I have several examples from Natal. It is found off Rodriguez, and breeds at the Andaman Islands, where the eggs, sent with the parent birds by Capt. Wimberley, are far handsomer in markings than any American specimens; and quite recently I have received from Capt. Vincent Legge, R.A., a lovely rose-tinted specimen from Ceylon, shot in May, with but little black on the mandibles. Capt. Legge writes that a month later the red in the bills of the birds still on the coast had almost disappeared, showing what a changeable and untrustworthy character the colour of the bill is. From Ceylon this species is found throughout the Malayan islands down to Houtmann's Abrolhos, on the west coast of Australia.

In North America, where it is far more abundant than in Europe, it breeds from Massachusetts to Florida and at the Bermudas; also in Central America, and visits various West-Indian islands. In the British Museum is a skin registered as obtained at Taboga; and, the only place I know of that name being an island off Panama, this is a considerable extension of its range, if the locality can be trusted.

STERNA CANTIACA, Gm.

Sterna cantiaca, Gm. Syst. Nat. i. p. 606 (1788); Schl. Mus. P. B. *Sternæ*, p. 5 (1863); Layard, B. S. Africa, p. 370 (1867); Scl. & Salvin, P. Z. S. 1871, p. 569; Coues, B. N.W. Am. p. 673 (1874).

Sterna africana, Gm. Syst. Nat. i. p. 605 (1788), jr.

Sterna boysii, Lath. Ind. Orn. ii. p. 804 (1790).

Sterna canescens, Meyer & Wolf, Tasch. deutsch. Vög. ii. p. 458 (1810).

Thalasseus cantiacus, Boie, Isis, 1822, p. 563; Blas. J. f. Orn. 1866, p. 81.

Actochelidon cantiacus, Kaup, Sk. Entw. Eur. Thier. p. 31 (1829), type of *Actochelidon*.

Thalasseus canescens et *candicans*, Brehm, Vög. Deutsch. pp. 776, 777 (1831).

Sterna acuflavida, Cabot, Pr. Bost. Soc. ii. p. 257 (1847); Lawr. Birds B. N. Am. p. 860 (1858).

Thalasseus acuflavidus, Coues, Pr. Phil. Ac. 1862, p. 540.

Actochelidon cantiaca, Gray, Hand-list, iii. p. 119 (1871).

It is now generally admitted that the European and American birds are identical. The range of this species may therefore be broadly described as from Northern Europe to the Cape of Good Hope and the Bay of Bengal in winter, and along the Atlantic coast of North America to the West-Indian Islands, Honduras (probably its southern breeding-limit), and Brazil, at least as far as Bahia, whence I have a specimen.

STERNA ELEGANS, Gamb.

Sterna elegans, Gambel, Pr. Phil. Ac. iv. 1848, p. 129 (Mazatlan); Lawr. Birds N. A. p. 860 (1858).

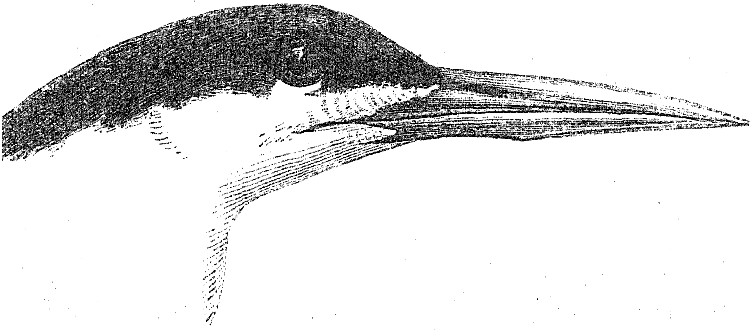
Thalasseus elegans, Gamb. Journ. Phil. Acad. ser. 2, vol. i. p. 228 (1849); Coues, Pr. Phil. Acad. 1862, p. 540; Ibis, 1864, p. 389 (San Salvador); Salvin, Ibis, 1866, p. 198 (Fonseca Bay).

Sterna comata, Phil. & Landb. Wieg. Arch. 1863, pt. 1, p. 126.

Sterna galericulata (part.), Scl. & Salv. P. Z. S. 1871, p. 569; Coues, Key, p. 319 (1872), B. N.W. Am. p. 671 (1874).

A recent examination of Lichtenstein's type of *S. galericulata* has shown it to be identical with the Cayenne Tern, *S. maxima*, Bodd.; so that Gambel's name must be restored. It occurs on the Pacific side of America, from the Gulf of California to the coasts of Peru and Chili; but I consider that the bird found on the Atlantic coast is distinct, although closely allied. Three specimens which I have examined in Mr. Salvin's collection, from the Pacific side, and two others in the British Museum, from Chili or Bolivia, all agree in having a longer foot and tarsus (·2 inch) than the Atlantic bird; but the principal distinction is in the bill; the angle of the lower mandible being well in advance of the front portion of the nostril (·5 inch diagonally) in the Pacific birds, whereas the angle is almost directly under the nostril in the Atlantic form; the colour of the bill also is red or orange in the former and yellow in the latter, even in tolerably fresh specimens, which still preserve the beautiful roseate tint of the underparts. It is perhaps as well to mention that these remarks are founded upon perfectly well-made skins, the tips of the mandibles being in their proper relative positions; otherwise it might be supposed that the under mandible had been unduly drawn back; the difference, however, on comparison, is very striking, as will be seen by the annexed woodcut.

Fig. 1.



Head of *Sterna eurygnatha.*

As the Atlantic bird has not hitherto been distinguished, I propose to call it

STERNA EURYGNATHA, sp. nov.

S. *similis* Sternæ eleganti, *sed rostro flavo et mandibulæ angulo sub narium apertura antica posito distinguenda.*

Similar to *S. elegans*, but a trifle smaller; bill less robust and yellow, whereas in *S. elegans* it is orange-red, the angle of the lower mandible almost immediately below the front of the nostril.

Sterna elegans, Leotaud, Ois. Trinidad, p. 542 (1866).

? "*Sterna cayanensis*, Gmel.," v. Pelzeln, Orn. Brasil. p. 323 (1871).

Range, from Santa Catharina, S. Brazil (*Rogers*), to the island of Trinidad, Leotaud's bird being most probably this species.

STERNA MEDIA, Horsfield.

Sterna media, Horsfield, Trans. Linn. Soc. 1820, xiii. p. 198 (type in E. I. Mus., examined, *H. S.*); Finsch & Hartl., Orn. Ost-Afr. iv. p. 830 (1870); Irby, Orn. Str. Gibraltar, p. 209 (1875).

Sterna affinis, Rüpp. (nec Horsf.) Atlas, p. 23. tav. 14 (1826) (Red Sea); Temm. Man. d'Orn. iv. p. 454 (1840) (Sicily); Schlegel, Mus. P.-Bas, *Sternæ*, p. 6 (1863); Degl. & Gerb. Orn. Eur. ii. p. 454 (1867).

Sterna bengalensis, Lesson, Tr. d'Orn. p. 621 (1831); Pucheran, Rev. Zool. 1850, p. 542; Jerdon, B. India, iii. p. 843 (1864).

Thalasseus torresii, Gould, P. Z. S. 1842, p. 140, B. Australia, vii. pl. 25 (1848).

Thalasseus bengalensis, Gould, Handbk. B. Australia, ii. p. 397 (1865).

Thalasseus affinis, Blas. J. f. Orn. 1866, p. 82.

Actochelidon affinis, Gray, Hand-list, iii. p. 119 (1871).

This species may be considered an eastern representative of the preceding; but it is slightly smaller, the mandibular angle more advanced, and can always be distinguished by its *pearl-grey rump and tail*. It ranges from the Straits of Gibraltar, along the Mediterranean, down the Red Sea to Madagascar, and eastwards along the Indian coast and islands, throughout the Malay archipelago, the Aru Islands, down to Torres Straits and Port Essington.

STERNA MAXIMA, Bodd.

Grande Hirondelle de Mer de Cayenne, Buffon, Ois. viii. p. 346.

Sterna maxima, Boddaert, Tabl. des P. Enl. p. 58. no. 988 (1783); Scl. & Salv. P. Z. S. 1871, p. 567 (Neotrop. Larid.).

Sterna cayennensis, Gmelin, Syst. Nat. 1788, i. p. 604; Leot. Ois. de Trinidad p. 535 (1866).

Sterna cayana, Latham, Ind. Orn. p. 804. no. 2 (1790); Steph. in Shaw's Gen. Zool. xiii. p. 155 (1825).

Sterna galericulata, Licht. Verz. Doubl. p. 81 (1823) (type in Berlin Mus., examined, *H. S.*); Pelzeln, Orn. Bras. p. 324 (1871); Schlegel, Mus. P.-B. *Sternæ*, p. 7 (1863).

Sterna erythrorynchos, Wied, Beitr. iv. p. 857 (1833); Tschudi, F. Per., Aves, p. 305 (1846).

Sterna cristata, Swains. B. W. Africa, ii. p. 247, pl. xxx. (1837) (type in Camb. Mus. examined, *H. S.*).

Thalasseus cayanus, Bp. List, 1838, p. 61; Gosse, B. Jamaica, p. 431 (1847).

Sterna regia, Gambel, Proc. Phil. Acad. iv. 1848, p. 228; Lawr. B. N. Am. p. 859 (1858); Coues, Key, p. 319 (1872), B. N.W. Am. p. 669 (1874).

Thalasseus regius, Gamb. J. Phil. Ac. i. 1849, p. 228; Coues, Proc. Phil. Ac. 1862, p. 539.

Phætusa regia, Bp. Compt. Rend. p. 772 (1856).

Thalasseus galericulatus, Blas. J. f. Orn. 1866, p. 82.

Thalasseus cayennensis, Gray, Hand-list, iii. p. 120 (1871); Shelley, Ibis, 1872, p. 293.

Sterna bergii, Irby, Orn. Str. Gib. p. 209 (1875) (coll. Lilford; sp. examined, *H. S.*).

I fully agree with Messrs. Sclater & Salvin that Buffon's plate on which *Sterna maxima* of Boddaert is founded, represents this species. Mr. Salvin and myself have also carefully compared Lichtenstein's type specimen of *S. galericulata* with our respective series of American specimens, and find them identical; I have also compared a good many specimens from the Gold Coast, all in winter plumage, and mostly obtained in the early spring. The specimen in Lord Lilford's collection, which was obtained by the late M. Favier in the Straits of Gibraltar, and was purchased from his successor by Col. Irby, undoubtedly belongs to this species.

Some North-American examples are a trifle more robust in the bill than either Brazilian or African specimens; but there is no constant difference, even in this particular.

On examining Lichtenstein's type of *S. galericulata*, the outer primaries proved to be partially in the sheath, and about two inches shorter than their natural length, explaining the original description of "the tail being 2 inches longer than the wings" which had previously been a great puzzle, there being no Tern of this size known in which the proportions were such. This species has a somewhat wide range, as it is found on the Pacific coast from California to Peru, whilst on the Atlantic sea-board it has once occurred as far north as Massachusetts; it breeds on the coast of Florida, and on some of the cays of the West-Indian Islands, and visits South Brazil. Its occurrence on the African coast has already been noticed; but at present there is no record of its breeding there.

STERNA CASPIA, Pall.

Sterna caspia, Pall. Nov. Comm. Petrop. xiv. p. 582 (1769–70); Pall. Zoog. Rosso-As. p. 332 (1811).

Sterna tschegrava, Lepechin, Nov. Comm. Petrop. xiv. p. 500 (1769–70).

Sterna caspica, Sparrm. Mus. Carl. ii. fasc. 3, no. 72 (1788); Kirk, Ibis, 1864, p. 337 (mouth of Zambesi, breeding).

Sterna megarhynchos, Meyer & W. Tasch. deutsch. Vög. ii. p. 457 (1810).

Thalasseus caspius, Boie, Isis, 1822, p. 563; Coues, Proc. Phil. Acad. 1862, p. 538, and *T. imperator* in text; Gray, Hand-list, iii. p. 120 (1871).

Hydroprogne caspica, Kaup, Sk. Entw. eur. Thier. p. 91 (1829).

Sylochelidon caspia, Brehm, Vög. Deutsch. p. 770 (1831), type of *Sylochelidon*; Blas. J. f. Orn. 1866, p. 82; Gould, Handbk. B. Austr. ii. p. 392 (1865).

Sylochelidon balthica et *S. schillingii*, Brehm, Vögel Deutsch. p. 769, 770 (1831).

Helopus caspius, Wagler, Isis, 1832, p. 1224 (type of *Helopus*).

Thalassites melanotis, Swain. B. W. Af. ii. p. 253 (1837) (type in Camb. Mus. examined, *H. S.*).

Sylochelidon strenuus, Gould, P. Z. S. 1846, p. 21; Gould, B. Austr. vii. pl. 22 (1848).

Sylochelidon melanotis, Bp. Compt. Rend. 1856, p. 772.

Sterna melanotis, Hartl. Orn. West-Afr. p. 254 (1857).

Sterna major, Ellman, Zool. 1861, p. 7472.

This large and well-known Tern is found from Northern Europe to New Zealand, and in America from Labrador, where it breeds, down to New Jersey. Mr. Bernard Ross also found it as far west as Great Slave Lake and the Mackenzie river.

It is now generally conceded that there is but one species.

With regard to the name, Dr. Elliott Coues very justly remarks that it is undesirable to adopt Lepechin's cacophonous name, in place of the well-known one given by Pallas, merely on the score of a priority of 82 pages.

STERNA BERNSTEINI, Schlegel.

Sterna bernsteini, Schlegel, Mus. P.-B. *Sternæ*, p. 9 (1863) (♂, winter E. coast of Halmahera; type in Leyden Mus. examined, *H. S.*).

Thalasseus bernsteini, Blas. J. f. Orn. 1866, p. 81.

This large and very light-coloured species, the mantle being even paler than in *S. cantiaca* or *S. maxima*, is classed by Prof. Schlegel amongst the group which has the white frontlet band in the breeding-plumage. This may be the case; but I can discern no proof of it in the type and only specimen in the Leyden Museum, nor in two others from the Island of Rodriguez in the British Museum, nor in two others from Round Island and Ile de la Baleine, in the collection of Messrs. A. & E. Newton; for all these, the only ones I have ever seen, are equally in winter dress. The bill is yellow; but the black at the apex in the type is probably an individual peculiarity.

This Tern is closely allied to *S. maxima*; and, until we obtain a specimen in full plumage, its place seems to be next to it in order. The dimensions are:—Wing 12·5 to 13 inches; tarsus 1·1; foot, including middle claw, 1·15; bill 1·8.

STERNA BERGII, Licht.

Sterna bergii, Licht. Verzeich. p. 80 (1823), South Africa (type in Berlin M. examined, *H. S.*); Schlegel, Mus. P.-Bas, *Sternæ*, p. 11 (1863); Finsch & Hartl. Vög. Ost-Afr. p. 828 (1870); Shelley, B. of Egypt, p. 298 (1872).

Sterna cristata, Steph. in Shaw's Gen. Zool. xiii. pt. i. p. 146 (1825) (nec Swainson); Swinhoe, Ibis, 1860, p. 68, 1863, p. 30.

Sterna velox, Rüpp. Atlas, p. 21, t. 13 (1826), Red Sea (type at Frankfort examined, *H. S.*); Thomson, Nat. Hist. Ireland, iii. p. 226 (1847), "between Dublin and Howth, end of Dec. 1846, in full breeding-plumage" (!); Swinhoe, Ibis, 1860, p. 429, 1861, p. 345, 1866, p. 134; Kirk, Ibis, 1864, p. 339 (breeding at mouth of Zambesi).

Sterna pelecanoides, King, Surv. Int. Austr. ii. p. 422 (1826).

Sterna longirostris, Lesson, Traité d'Orn. p. 621 (1831); Pucheran, Rev. Zool. 1850, p. 635; Boie, Isis, 1844, p. 181.

Pelecanopus pelecanoides, Wagler, Isis, 1832, pp. 277 & 1225, type of *Pelecanopus*.

Thalasseus pelecanoides, Gould, B. Austr. vii. pl. 23 (1848); Gray, Gen. Birds, iii. p. 658; Swinhoe, P. Z. S. 1871, p. 422.

Thalasseus poliocercus, Gould, B. Austr. vii. pl. 24 (1848), Handbk. B. Austr. ii. p. 396 (1865).

Sterna rectirostris, Peale, Zool. U.S. Expl. Exped. p. 281 (1848).

Sylochelidon polyocerca, G. R. Gray, List of *Anseres*, Brit. Mus. p. 175.

Sterna novæ-hollandiæ (Mus. Paris.), Pucheran, Rev. Zool. 1850, p. 545 (type in Paris Mus. examined, *H. S.*)

Pelecanopus velox, *P. bergii*, et *P. poliocercus*, Bonap. Compt. Rend. xlii. p. 772 (1856).

Sterna poliocerca, Schlegel, M. P.-Bas, *Sternæ*, p. 12 (1863); G. R. Gray, Ibis, 1862, p. 249.

Thalasseus cristatus, Swinhoe, P. Z. S. 1863, p. 329; Jerdon, B. of India, iii. p. 842 (1864); Gould, Handbk. B. Austr. ii. p. 394 (1865).

Thalasseus bergii, Blas. J. f. Orn. 1866, p. 81.

"*Phætusa astrolabæ*, Bp." in Paris Mus. from Tonga-tabu, Voy. of Quoy & Gaimard. Another specimen so marked=*S. frontalis*—*H. S.*

The distinguishing character of this large Sea-Tern is the white band of feathers across the base of the bill. In the adult plumage, and even in winter plumage, there is no other species of its size in which the mantle and tail are of so dark a grey; but it must be admitted that between extreme individuals from different localities there is a considerable difference in intensity of coloration. In a series, however, they blend so gradually as to make it impossible to draw a line; whilst with regard to the smaller race, which has received the name of *S. poliocerca*, there are similar imperceptible gradations in size. The types, of *S. bergii* from the Cape of Good Hope and of *S. velox* from the Red Sea, are identical in size and colour, and are not perceptibly lighter in colour than "*S. pelecanoides*;" but in Madagascar specimens, and also in some from Damara-land, the mantle is of a lighter shade. Locality does not assist in separating them; for it is clear that the light- and the dark-backed birds cross each other's line at Madagascar.

From the Cape of Good Hope and from the Red Sea (with the exception of Madagascar), throughout the Indian Seas, Ceylon, the Malay archipelago, the China seas, down to Australia and the Fiji group, we find a uniformly dark mantle and tail; but at Ceylon we begin to meet with a race which differs in no respect but that of size, and this by imperceptible gradations. I must therefore follow Messrs. Finsch & Hartlaub, and unite these three varieties under one head. Before coming to this conclusion, I have examined about 70 specimens, and must especially acknowledge the great assistance I have received from the fine series of sexed and dated specimens sent to me from Ceylon by Capt. V. Legge, R.A. It is at Ceylon that the two races seem to unite, large and small examples occurring throughout the year in the same locality and flocks; and the difference thus becomes reduced to one of mere individual peculiarity. A series of measurements show that in length of wing (14 inches) and general dimensions, some Australian specimens are fully equal to the largest African ones; Polynesian examples are somewhat smaller, and there is less of a brown tinge in the colour of the back. This Tern appears to range as far as the Sandwich Islands; but I have not seen specimens.

The description given by Thompson, in the 'Birds of Ireland,' of the bird killed between Howth and Dublin undoubtedly applies to this species; but it is to be regretted that he did not see it *in the flesh*, as the fact of the specimen having the black head and white frontlet band (the mark of the *fullest breeding-plumage*) at the end of *December*, is somewhat remarkable. I learn from Mr. A. G. More, of the Dublin Museum, that this specimen is no longer in existence, having been burned with the rest of Mr. Walter's collection many years ago.

STERNA FRONTALIS, Gray.

? *Sterna striata*, Gm. Syst. Nat. i. p. 609 (1788): *Striated Tern*, Lath. Syn. iii. 2, p. 358, pl. 98—New Zealand (from a drawing by Sir J. Banks), jr.

Sterna velox, Gould (nec Rüpp.), P. Z. S. 1842, p. 140.

Sterna frontalis, Gray, Voy. Erebus & Terror, p. 19 (1844); Hand-list, iii. p. 118 (1871); Buller, B. New Zealand, p. 281 (1873).

Sterna albifrons, Peale, U.S. Expl. Exp. Birds, p. 279 (1848).

Sterna melanorhyncha, Gould, B. Australia, vii. pl. 26 (1848)—Van Diemen's Land; id. Handbk. B. Australia, ii. p. 398 (1865); v. Pelzeln, Orn. Novara-Reise, p. 154 (1865); Gray, Hand-list, iii. p. 118 (1871).

Sterna atripes, Ellman, Zoologist, 1861, p. 7473.

Sterna longipennis, Finsch (nec Naum.), J. f. Orn. 1867, p. 339.

"*Phætusa astrolabæ*, Bp.," specimen in the Paris Mus. from Tongatabu, Quoy & Gaimard's Voy., is a young bird; but another bird from same locality and similarly named=*S. bergii*!—*H. S.*

After comparing an immature specimen of this species with Latham's plate of the Striated Tern from New Zealand, I have no doubt in my own mind that this was the bird he figured; but it must be admitted that the drawing and description would almost equally suit the young of the Sandwich Tern; and *S. striata*, Gm., has in consequence been generally referred to that species. On the other hand there can be no possible doubt as to the identity of Gray's description, accompanied as it is by a plate of the *adult* bird. I think, therefore, that it is desirable to retain the name of *S. frontalis*, in preference to making a change which might be considered arbitrary, and would certainly be productive of temporary confusion.

In the white border to the inner webs of the primaries this Tern resembles *S. dougalli*, as remarked by Mr. Gould; it is, however, larger than that species, although not equal in size to *S. cantiaca*; and the white frontal band and black bill will always serve to distinguish it.

It appears to be a true Sea-Tern, breeding, according to Mr. Buller, in large colonies, and depositing its single egg on the bare rock, close to high-water mark. I have not seen specimens of the eggs; but, from the description, they seem to approach those of *S. cantiaca* in their general character.

Under the name of *S. melanorhyncha*, Mr. Gould records the occurrence on the coast of Tasmania of a Tern which appears to be identical with this species; but with that exception it does not seem to leave the shores of New Zealand.

STERNA TRUDEAUII, Audubon.

Sterna trudeauii, Aud. Orn. Biog. v. p. 125; id. B. Am. vii. p. 105 (1844); Lawr. B. N. Am. p. 861 (1860); Schl. Mus. P.-B. *Sternæ*, p. 29 (1863); Gray, Hand-list, iii. p. 118 (1871); Scl. & Salv. P. Z. S. 1871, p. 570 (Neotrop. Lar.); Landb. An. Univ. Chile, 1872, p. 515; Coues, B. N.W. Am. p. 675 (1874).

Phætusa trudeauii, Blasius, J. f. Orn. 1866, p. 73.

Sterna frobeenii, Ph. & Landb. Wieg. Arch. 1863, p. 125; Cat. Av. Chil. p. 49 (fide Scl. & Salv.); Landbeck, An. Univ. Chile, 1872, p. 515; Gray, Hand-list, iii. p. 118 (1871).

This well-marked species is similar in size, shape of bill, and general plumage to *S. forsteri* in winter dress; but, unlike the majority of Terns, it *never has the crest black*, the crown being pure white, with only a transocular line on each side of the head; the mantle, wings, and tail are light grey; the rump white, and the feet yellow. It occurs along the coast of South Brazil and the Argentine provinces, and also on that of Chili; but of its breeding-places and eggs nothing is yet known; indeed, until lately, even skins were extremely rare in collections.

Messrs. Sclater & Salvin and Dr. E. Coues are doubtful as to the type of this species having been really obtained on the coast of New Jersey—a doubt in which I share; but there is now no means of disproving Audubon's statement. With regard to *S. frobeeni*, which Messrs. Sclater and Salvin identified with this species, Mr. L. Landbeck, in the 'Anales de la Universidad de Chile,' maintains their distinctness, and gives an elaborate comparative description of each, the result of which is, to my mind, to show more clearly than ever that his *S. frobeeni* is merely the present bird in immature plumage.

STERNA MELANAUCHEN, Temm.

Sterna melanauchen, Temm. Pl. Col. v. pl. 427 (1838?); Gould, B. Austr. vii. pl. 28 (1848); Schlegel, Mus. P.-B. *Sternæ*, p. 28 (1863); Finsch & Hartl. B. Central Polyn. p. 224 (1867).

Onychoprion melanauchen, Blyth, Cat. Birds Mus. As. Soc. p. 293 (1849); Jerdon, B. India, iii. p. 844; Swinhoe, Ibis, 1867, p. 230; id. P. Z. S. 1871, p. 422 (Amoy); Walden, Ibis, 1874, p. 149.

Sternula melanauchen, Bp. Compt. Rend. xli.; Blasius, J. f. Orn. 1866, p. 74; Gray, Hand-list, iii. p. 121 (1871).

Sterna marginata, Blyth (*fide* Jerdon), juv.

Gygis, sp? et *Gygis decorata*, Hartlaub, Ibis, 1854, p. 232; Godeffroy's Cat. i. (1864) p. 5.

In this species the feet are strong and fully webbed; but I see no reason for separating it from true *Sterna*. It ranges from the Andaman and Nicobar Islands, throughout the Malay archipelago, and up the China coast to Amoy, down to the northern coasts of Australia, New Caledonia, and as far as the Fiji group. The eggs, specimens of which I owe to the kindness of Capt. Wimberley stationed at the Andaman Islands, are two in number, and are of a clay-white ground-colour, minutely spotted with brown of various shades; in some varieties the ground-colour is nearly pure white.

We now come to a group for which, making *S. minuta* his type, Boie proposed the genus *Sternula*—one which I regret to be unable to adopt, owing to the absence of any structural distinctions; for in some respects it is a very convenient subdivision, and the name explains itself.

There are four forms of small Tern with white forehead and black lores, the distinguishing features of which have frequently been overlooked, and various species thereby confounded. It is difficult to give the exact range of each; for the young are not always to be recognized with facility. But the characters of the adults may be briefly enumerated.

STERNA MINUTA, Linn.

Sterna minuta, Linn. Syst. Nat. i. p. 228 (1766), et auct.

Sternula minuta, Boie, Isis, 1822, p. 564, type of *Sternula*.

Other synonyms are unimportant and need not be given here.

This Tern, which has *dark* shafts to the outer primaries, and the rump and tail *white*, ranges throughout temperate Europe to India, occurs in winter on coast of West Africa as far as the Cape of Good Hope, whence there is a specimen in the British Museum.

STERNA ANTILLARUM, Less.

Sterna antillarum, Lesson, Desc. Mamm. et Ois. p. 256 (1848); Coues, Proc. Phil. Acad. 1862, p. 552; Scl. & Salv. P. Z. S. 1871, p. 571.

Sterna argentea, Nutt. Man. ii. p. 280 (1834); Léotaud, Ois. Trinidad, p. 545; Wied, Beit. iv. p. 871 (1833); Burm. Syst. Uebers. iii. 542; Pelz. Orn. Bras. p. 325.

Sterna frenata, Gamb. Proc. Phil. Ac. 1848, p. 128.

Sterna superciliaris, Cab. J. f. Orn. v. 232; Coues, Key, p. 332 (1872).

Sterna superciliaris, var. *antillarum*, Coues, B. N.W. Am. p. 692 (1874).

Similar to the above, and has also *dark* shafts to primaries; but *the rump and tail-coverts are pearl-grey* like the mantle, and there is but little black at tip of bill.

Ranges throughout temperate America, on both coasts, and down to the Antilles, Trinidad, lat. 10° N.

STERNA SUPERCILIARIS, Vieill.

Sterna superciliaris, Vieillot, N. D. xxxii. p. 126 (1819), based on the *Hati ceja blanca* of Azara; Scl. & Salv. P.Z.S. 1871, p. 571; Coues, B. N.W. Am. p. 692 (1874), in part.

Back, rump, and tail slightly darker than in the above; bill stouter and entirely yellow; the legs and feet also are of an olivaceous colour in my Amazon specimens, very different from the bright yellow of those parts in the two foregoing*.

Is found on all the large South-American rivers from the Parana upwards, is plentiful on the Amazons and the Ucayali, and I found it abundant on the river Huallaga still further west.

STERNA SINENSIS, Gm.

Sterna sinensis, Gm. Syst. Nat. i. p. 608 (1788), based on the Chinese Tern of Latham.

Sterna minuta, Horsf. Trans. Linn. Soc. 1820, xiii. p. 198.

Sternula sinensis, Swinhoe, Ibis, 1863, p. 430; id. P. Z.S. 1863, p. 329.

Sternula minuta, Swinhoe, P. Z. S. 1871, p. 422 (Formosa and China).

Sternula placens, Gould, Ann. Nat. Hist. viii. p. 192 (1871); id. B. New Guinea, pt. iii. pl. 7 (May 1876).

Like *S. minuta*, but *shafts* of outer primaries *white*; as a rule also the bird is a trifle larger and stouter, and has a longer development of lateral tail-feathers than *S. minuta*.

Ranges from Ceylon, where it breeds, to the China seas, to Queensland, and down the Australian coast; how far I cannot say, as I have no specimens from there with trustworthy localities. From Ceylon Capt. Vincent Legge, R.A., has sent me a fine series, with the eggs, which are, as might naturally be expected, like those of *S. minuta*. He also sent me a nestling with the outer quill-feathers only partially developed; and on comparing it with a

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* Dr. Coues (B. of N.W. Am. p. 694) distinguishes *S. antillarum* from *S. minuta* by its grey rump and smaller bill with little black at the tip; but he goes on to argue that because it has sometimes no black at all on the bill, as is the case with *S. superciliaris*, which has, in its turn, a bill as stout or stouter than *S. minuta*, therefore *S. superciliaris* and *S. antillarum* are to be united. I fail to see how he can consistently do this without putting *all* the small Terns under one head; for the stout bill, especially so from the angle to the tip, and the abrupt prolongation of the outer tail-feathers in *S. superciliaris*, to say nothing of coloration, suffice to distinguish it from any other member of the group.

S. minuta of the same age, the difference in the colour of the shafts of the primaries was very apparent. There is often a grey tint on the rump and tail-coverts of winter-killed and immature specimens.

STERNA SUMATRANA, Raffl.

Sterna sumatrana, Raffles, Trans. Linn. Soc. xiii. (1822) p. 329.
Sterna pusilla, S. Müller (*fide* Gray)—Timor and Java.

Bill smaller and more slender than even in *S. antillarum*, but with much black between the angle and tip; tail-coverts and tail *grey as in the back*; shafts of primaries *black*.

Captain V. Legge has sent me a nearly adult specimen of this Tern from Ceylon; and the fact of two such different forms as this and the preceding being met with there is somewhat remarkable; a similar specimen is in my collection, from the coast of Fantee. Lord Walden has a specimen from Zoulla, Red Sea, obtained by Mr. W. Jesse; and that is all I know about this small dark form of the group, which is even darker than *S. antillarum* on the rump and tail, and has also a good deal more black on the bill. I have adopted Raffles's name for it, because the description and locality seem to fit it fairly; and, in default of a larger series, I do not wish to incur the odium of making species upon slight grounds.

STERNA NEREIS (Gould).

Sternula nereis, Gould, P. Z. S. 1842, p. 140, B. Australia, vii. pl. 29 (1848)—Bass's Straits and West Australia.
Sterna parva, Ellman, Zoologist, 1861, p. 7473.
Sterna nereis, Pelzeln, Verh. zool.-bot. Gesellsch. Wien, xxii. p. 318 (1867); Buller, B. New Zeal. p. 285 (1873).
Sterna minuta, Finsch, J. f. Orn. 1867, pp. 337, 347.
Sterna alba, Potts, Trans. N.Z. Inst. 1870, p. 106.

This species, which appears to be confined to Australia and New Zealand, may be distinguished from the other small Terns by its somewhat larger size, the paler grey of the mantle and especially of the primaries, and by its having *no black lores*, but only a dark *spot* in front of the eye. In the young the distinction is not so easy; but the primaries are always lighter than in *S. minuta* or *S. sinensis*.

STERNA EXILIS, Tsch.

Sterna exilis, Tschudi, F. Per., Aves, p. 306 (1846); Sclater, P. Z. S. 1867, pp. 336 & 344; Scl. & Salv. P. Z. S. 1871, p. 572.
Sterna lorata, Ph. & Landb. Wieg. Arch. 1863, pt. i. p. 124.
Sternula loricata (!), Gray, Hand-list, iii. p. 121 (1871).

The general smoke-grey of the under as well as the upper parts, and the large amount of black on the bill, will always serve to distinguish this species, of which I have only seen two specimens—one in Messrs. Salvin and Godman's collection, and one in the British Museum. Both these are from the coast of Peru and Chili; but of its breeding-places we know nothing at present.

STERNA BALÆNARUM (Strickl.).

Sternula balænarum, Strickl. Contr. Orn. 1852, p. 160; Gurney, Andersson's B. Damar. p. 363 (1872).

In this species there is no white frontlet, the black feathers coming down to the base of the bill, which is slender and black, except at the gape; the tail is grey like the mantle; and the tarsi and feet are the smallest of those of the group. The shafts of the primaries are *white.*

Walwich Bay to the Cape of Good Hope is its range, so far as is known.

STERNA ALEUTICA, Baird.

Sterna aleutica, Baird, Tr. Chicago Acad. 1869, 321, pl. 31. fig. 1 (Alaska); Dall & Bann. ib. p. 307; Coues, Key to N.-Am. B. p. 322 (1872), B. of N.W. Am. p. 696 (1874); Gray, Hand-list, iii. p. 118 (1871).

After a careful examination of Pallas's description of *Sterna camtschatica*, I fully agree with Dr. E. Coues that Dr. O. Finsch has no sufficient reason for identifying it with this species (Abh. nat. Ver. Bremen, iii. p. 85). It is needless to repeat here the excellent descriptions given by the above American authors, the last of whom informs us that since the acquisition of the type three more specimens have been obtained. With its head-markings similar to those of the Sooty Tern (*Sterna fuliginosa*), from which, again, it differs in having a *white rump and tail*, it certainly presents a most interesting link in coloration between the Sooty and the typical Terns, groups which I cannot separate generically for want of well-defined structural differences. Indeed Dr. Coues seems inclined to give up *Haliplana* as a genus; and as the only distinction appears to be in the coloration, it is not easy to see how it can be retained according to the modern definition of a genus. The type was obtained at Kadiak, Alaska, in June, with the egg; so that it was in full breeding-plumage; but of the immature stages we have as yet no description.

STERNA ANÆSTHETA (Scop.).

Sterna anæthetus (sic), Scop. Del. Faun. et Flor. Ins. i. p. 92. no. 72 (1786), ex Sonn. Voy. p. 125, pl. 84.

Sterna panayensis, Gm. S. N. ii. p. 607 (1788).

Sterna oahuensis, Bloxham, Voy. 'Blonde,' p. 251 (1826).

Haliplana panayensis, Wagler, Isis, 1832, p. 1224; Salvin, Ibis, 1864, p. 381, 1866, p. 199; Blas. J. f. Orn. 1866, p. 80.

"*Sterna antarctica*, Cuv.," Lesson, T. d'Orn. p. 621 (1831); Pucheran, Rev. Zool. 1850, p. 541. (Admitted to be *S. panayensis.*)

Onychoprion panaya, Gould, B. Austr. vii. pl. 33 (1848).

Sterna infuscata, Heugl. Ibis, 1859, p. 351; id. F. Roth. Meeres, p. 32.

Sterna panaya, Heugl. F. Roth. Meeres, p. 31; Finsch & Hartl. Vög. Ost-Afr. p. 833 (1870).

Onychoprion panayensis, Scl. & Salv. P. Z. S. 1871, p. 572.

Haliplana discolor, Coues, Ibis, 1864, p. 392; Elliot, B. N. Am. ii. pl. 57 (1869).

? *Hydrochelidon somalensis*, Heugl. Orn. N.O.-Afr. p. 1458, p. ccvii (1873).

Haliplana anosthætus, Gray, Hand-list, iii. p. 122 (1871).

Sterna melanoptera, Swainson, B. W. Afr. ii. p. 249 (1837) (type in Camb. Mus. examined, *H. S.*).

This species, originally described from the Philippine Islands, is somewhat smaller than *S. fuliginosa*; the colour of the mantle is also less intensely dark. But the principal distinction is found in the feet, in which the webbing, instead of coming down to the claws between the outer and middle toe as in *S. fuliginosa*, only descends to the last joint, showing a more important structural difference between two such closely allied species than there is between *Onychoprion* and typical *Sterna*—an additional reason for discarding the former genus and its synonyms. The drawings show the shape of the feet in both species.

Fig. 2.

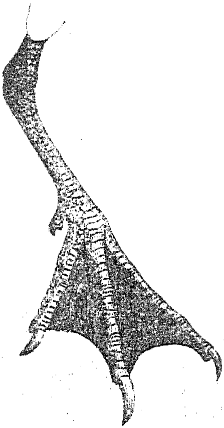


Fig. 2. Foot of *Sterna fuliginosa*.

Fig. 3.

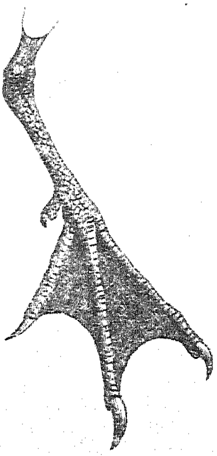


Fig. 3. Foot of *Sterna anæstheta*.

In the young of the present species the *underparts* are *light-coloured* on emerging from the downy stage, whereas in *S. fuliginosa* they remain dark for some time.

Its range appears to be nearly identical with that of *S. fuliginosa*, and is noticed under that head.

STERNA LUNATA, Peale.

Sterna lunata, Peale, U.S. Expl. Exp., Birds, p. 277 (1848); Cassin, U.S. Expl. Exp., Birds, p. 382 (1858); Schlegel, Mus. P.-

B. *Sternæ*, p. 27 (1863); Finsch & Hartl. F. Centralpolyn. p. 231, pl. xiii. fig. 3 (1867).

Haliplana lunata, Blas. J. f. Orn. 1866, p. 80; Gray, Hand-list, iii. p. 122 (1871).

This species is rather larger than the preceding; but the webs of the toes are similarly incised; the general colour is much greyer. Its range appears to be somewhat restricted, extending from the Moluccas to the Phenix and the Paumatu groups of the Polynesian Islands. There are no specimens in the British Museum; but I have examined those at Leyden, and find it a well marked species.

STERNA FULIGINOSA, Gm.

Sterna fuliginosa, Gm. Syst. Nat. i. p. 605 (1788); Aud. B. N. Am. vii. p. 90, pl. 432 (1840); Temm. & Schl. Fauna Japonica, p. 133, pl. 89 (1842); Lawr. B. N. Am. p. 861 (1858); Cassin, Orn. U.S. Expl. Exp. p. 386 (1858); Finsch & Hartl. Orn. Centralpolyn. p. 225 (1867), Vög. Ost-Afr. p. 831 (1870); Harting, Brit. Birds, p. 169 (1872).

Onychoprion fuliginosus, Wagler, Isis, 1832, p. 277 (type of genus *Onychoprion*, based on *S. serrata* of J. R. Forster's MS. Descr. An. p. 276, ed. Licht. 1844); Gould, B. Australia, vii. pl. 32 (1848); Sclater, P. Z. S. 1856, p. 144 (I. Ascension); Scl. & Salv. P. Z. S. 1871, p. 573.

Planetis guttatus, Wagler, Isis, 1832, p. 1222 (type of genus *Planetis*, based on *S. guttata* of J. R. Forster's MS. Desc. An. p. 211, ed. Licht. 1844).

Haliplana fuliginosa, Wagl. Isis, 1832, p. 1224 (type of genus *Haliplana*); Bp. Compt. Rend. 1856, p. 772; Coues, Pr. Phil. Acad. 1862, p. 556; id. B. N. W. Am. p. 698 (1874); Gray, Hand-list, ii. p. 122 (1871).

Sterna infuscata, Licht. Verz. Doubl. p. 81 (1823) (type in Berlin Mus. examined, *H. S.*).

Anous l'herminieri, Lesson, Desc. Mamm. et Ois. p. 255 (1847).

Sterna gouldii, Reichenbach, Schwimmvög. Supp. xii. fig. 829.

Sterna luctuosa, Phil. & Landb. Wiegm. Arch. p. 126 (1866).

Thalassipora infuscata, Gray, Hand-list, iii. p. 122 (1871).

"*Haliplana fuliginosa*, var. *crissalis*, Baird," Lawr. (Grayson) Proc. Bost. N.H. S. 1871, p. 285.

It will be observed that Wagler has based no less than three genera upon this single species—the first, *Onychoprion*, depending upon a supposed serration of the claw, evidently due to natural causes in the specimen he had before him, while the other two genera are based upon the slightest of structural differences. I confess I cannot see any good reason for erecting it into a genus, especially in view of the connecting-link formed by the preceding species.

Both this species and *S. anæstheta* range throughout the whole of the warmer portions of the world, there being no perceptible difference between individuals from the most widely separated localities. It is said that at Ascension Island the Sooty Terns, or

"Wideawakes," come every eight months to breed; if true, this is somewhat remarkable. The foot of this species is webbed to the extremity of the toes, as shown in the drawing (p. 665). The young are *dark* on the *underparts*.

Genus NÆNIA, Boie.

NÆNIA INCA (Lesson).

Sterna inca, Lesson, Voy. 'Coquille,' ii. p. 731. no. 145, atlas pl. 47 (1826).

Anous inca, Gray, Gen. Birds, iii. p. 661 (1849); Blas. J. f. Orn. 1866, p. 83.

Nænia inca, Boie, Isis, 1849, p. 189 (type of genus *Nænia*); Bp. Compt. Rend. xlii. p. 773 (1856); Scl. and Salv. P. Z. S. 1871, p. 567 (Neotrop. Laridæ); Gray, Hand-list, iii. p. 123 (1871).

Larosterna inca, Blyth, Cat. Mus. As. S. p. 293 (1849), type of *Larosterna*.

Inca mystacalis, Jard. Contrib. Orn. 1850, p. 32; Cassin, U.S. Expl. Exp. p. 391 (1858).

Anous inca, Gray, Gen. Birds, iii. p. 661 (1849)

Inca mysticalis, Jardine, Contr. Orn. 1850, p. 32; Cassin, U.S. Expl. Exped. p. 391 (1858)—Callao.

This well-marked form seems fairly entitled to generic distinction, the white drooping plumes beneath the eye, and the wattled gape being found in no other species: the hallux is also connected with the foot by a rudimentary web; the tail, however, is forked as in typical *Sternæ*, removing it from any close relationship to *Anous* where some have placed it. It appears to be a rock-breeding species confined to the coasts of Peru and Chili.

Genus GYGIS, Wagler.

GYGIS CANDIDA (Gm.).

? *Sterna alba*, Sparr. Mus. Carls. ii. fasc. i. No. 11 (1786); Gm. Syst. Nat. i. 2, p. 607 (1788); J. R. Forster, Descr. An. p. 179, ed. Licht. (1844).

Sterna candida, Gm. Syst. Nat. i. 2, p. 607 (1788).

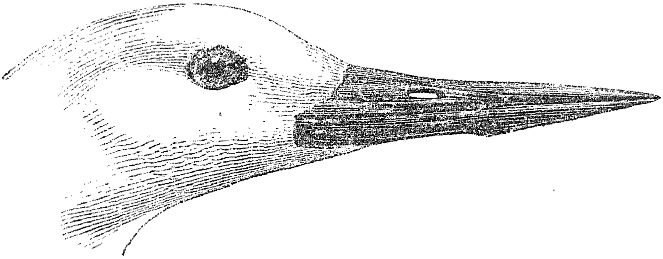
Gygis candida, Wagler, Isis, 1832, p. 1223, ex J. R. Forster, MS. (type of *Gygis*); Gray, Gen. Birds, iii. p. 660 (1849); Gould, B. Australia, vii. pl. 30 (1848).

Gygis alba (Sparr.), Cassin, U.S. Expl. Exp. p. 389 (1858); Blasius, J. f. Orn. 1866, p. 73; Finsch & Hartl. Faun. Centralpolynes. p. 232 (1867); Gray, Hand-list, iii. p. 122 (1871).

This beautiful and peculiar species is characterized by long slender toes with very deeply incised webs, and a graduated tail, approaching in shape that of the next genus, *Anous*. The shape of the bill is also peculiar, being broad at the base, and slightly tapering upwards in front of the mandibular angle. To this form have belonged all the examples which I have examined, or the descriptions of which I have compared, from Madagascar and throughout Polynesia until we reach the

Marquesas. From that group, apparently the outpost of the species, I have examined three specimens, which differ so remarkably from

Fig. 4.



Head of *Gygis candida*.

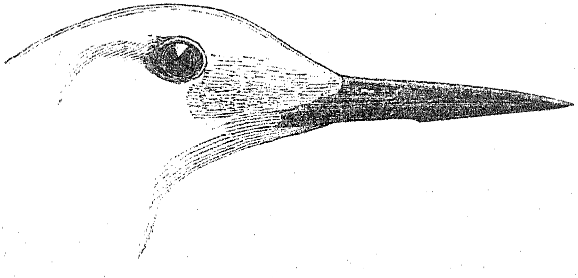
all others that I cannot consider them mere varieties, and propose for them the name of

GYGIS MICRORHYNCHA, sp. nov.

Alba: similis G. candidæ, *sed minor, rostro multo minore tenuiore, rectricum scapis albis nec nigris, distinguenda.*

In length of wing it is nearly an inch shorter than *G. candida*; the tail-feathers are more rounded, and the 3rd is the longest, whereas the 2nd is the longest in the larger species: the shafts of the first three primaries are merely clay-coloured, and the rest are pure white, whereas in *G. candida* they are all nearly black; and barely a trace of colour is to be observed on those of the tail. The bill is

Fig. 5.



Head of *Gygis microrhyncha*.

slender at the base, and quite different in shape from that of *G. candida* (as shown in the accompanying drawings).

Sparrman's figure and description are both very bad; but Gmelin's, based upon Latham, distinctly points out the characteristics of the larger and black-shafted species; so I have adopted his name for it. On the other hand I cannot identify Sparrman's bird with the smaller species, of which, moreover, I have never seen a specimen except from the Marquesas; and I have therefore been compelled to give a name to it. The larger species is also found at the Marquesas.

The nesting of *Gygis* is peculiar, the single egg of clay-white mottled with brown being placed on the cavity of the branch of a tree, or in a fork of two branches, and on the points of the coral reefs—anywhere, in fact, where it will lie. In these habits *Gygis* shows another affinity with *Anous*, of which it seems to be a highly specialized offshoot.

"*Sterna nivea*" of F. D. Bennett (Whaling Voy. i. p. 370, 1840), from the Caroline Islands, might be either of these species; and I can find no description of "*Gygis napoleonis*," Bp.

Genus ANOUS, Leach.

ANOUS STOLIDUS, Linn.

Sterna stolida, Linn. Syst. Nat. i. p. 227 (1766); id. Amœn. Acad. iv. p. 240; Gmelin, S. N. i. 2, p. 605 (1788).

Sterna fuscata, Linn. Syst. Nat. i. p. 228 (1766), ex Brisson, vi. p. 220, t. 20. fig. 1; Gmel. S. N. p. 605 (1788), juv.

Sterna pileata, Scop. Del. Faun. et Flor. Insubr. i. p. 92. no. 73, ex Sonn. Voy. p. 125, pl. 85 (1786).

Sterna senex, Leach, in Tuckey's Exped. to the Congo, App. p. 408 (1818), obtained by Cranch.

Anous niger, Steph. in Shaw's Gen. Zool. xiii. i. p. 140, pl. 17 (1825)—type of *Anous*, Leach (adult).

Anous fuscatus, Steph. in Shaw's Gen. Zool. xiii. i. p. 140 (1825), juv.

Anous spadicea, Steph. in Shaw's Gen. Zool. xiii. i. p. 143 (1825), juv.

Megalopterus stolidus, Boie, Isis, 1826, p. 980.

Sterna unicolor, Nordm. in Erm. Verz. v. Thier. & Pfl. p. 17 (1835).

Anous stolidus, Gray, List Gen. Birds, p. 100 (1841); Blyth, Cat. B. A. S. Bengal, p. 293; Gould, B. Australia, vii. pl. 33 (1848); Cassin, U.S. Expl. Exp. p. 391 (1858); Finsch & Hartl. Faun. Centralpolyn. p. 234 (1867), Vög. Ost-Afrika's, p. 835 (1870); Scl. & Salv. P. Z. S. 1871, p. 566 (Neotrop. Laridæ); Coues, B. N.W. Am. p. 710 (1874).

Anous rousseaui, Hartl. Beitr. Orn. Madagasc. p. 86 (1860).

This well-known species, a straggler to the British seas, ranges from the Gulf-coast of North America to the shores of Australia, throughout Polynesia, and occurs, in fact, in all tropical waters. There appears to be no constant difference between individuals from the most distant localities; and this similarity applies to its habits and breeding, its single egg being deposited on a nest of sea-weed placed on mangrove bushes, in the fork of a tree, or even on the bare rock.

In the British Museum there is a specimen from Dalrymple Rock, Chatham Island, one of the Galapagos group, which is of a uniform sooty brown. It is evidently an immature bird; and I am therefore unwilling to give it specific rank; but it would be somewhat remarkable if subsequent research should show that the Galapagos Islands possess a fuliginous Noddy in addition to their *Larus fuliginosus* and other peculiar forms of bird-life.

ANOUS TENUIROSTRIS (Temm.). (Plate LXI. fig. 1.)

Sterna tenuirostris, Temm. Pl. Col. 202 (1838).

Megalopterus tenuirostris (Temm.), Boie, Isis, (1826), p. 980, type of genus *Megalopterus*.

Anous melanops, Gould, P. Z. S. xiii. p. 103 (1845); id. B. Australia, vii. pl. 34 (1848); Gray, Hand-list, iii. p. 123 (1871).

Under this name two species appear to have been confounded. Temminck figures a bird with a light head and neck and *pale grey lores*. But the bird which is far more abundant in collections under this title is the species which has the *lores deep black*, figured in Gray's 'Genera of Birds' under the name of *A. melanogenys*. Temminck's type came from Senegal; and the only specimens like it which I have been able to examine as yet are two in the British Museum from the island of Rodriguez (from one of which the figure is taken), and one in Lord Walden's collection from Mauritius. In the absence of any detailed description it is impossible to say to which species the "*S. tenuirostris*" of various writers, from the Red Sea, belongs. Beyond the above localities it occurs at Houtmann's Abrolhos, on the west coast of Australia, whence Mr. Gould described and figured it under the name of *Anous melanops*. Mr. Gould's bird, however, appears to me to be identical with Temminck's, in spite of the stress laid upon the supposed absence of a black spot by the eye in Temminck's figure, which spot is conspicuously present in the plate of *A. melanops*. It seems to be a somewhat rare species, at least in collections. Besides the different coloration of the feathers between the base of the bill and the eye, it appears to be a somewhat smaller bird than *A. melanogenys*, the wing being nearly an inch shorter; the bill also, in the specimen I have seen, is relatively shorter between the angle and the tip; but a much larger series must be examined before attaching much importance to that peculiarity.

ANOUS MELANOGENYS, Gray. (Plate LXI. fig. 2.)

Anous melanogenys, G. R. Gray, Gen. Birds, iii. p. 661, pl. 182 (1849); id. Hand-list, iii. p. 123 (1871).

Anous tenuirostris, Scl. & Salv. Neotrop. Lar., P. Z. S. 1871, p. 566.

Respecting this black-faced species (see Plate LXI. fig. 2, taken from a specimen in my own collection) I can only repeat that it is generally found usurping the name of *Anous tenuirostris* in collections. It is apparently a widely distributed form, occurring on the coasts of Central America, Africa, Australia, and throughout Polynesia.

ANOUS LEUCOCAPILLUS, Gould. (Plate LXI. fig. 3.)

Anous leucocapillus, Gould, P. Z. S. pt. xiii. (1845) p. 103; id. B. Aust. vii. pl. 35 (1848); Cassin, U.S. Expl. Exp. p. 393 (1858);

Finsch & Hartl. F. Centralpolynesiens, p. 237 (1867); Gray, Hand-list, iii. p. 123 (1871).

Sterna leucocapilla, Schlegel, M. Pays-Bas, *Sternæ*, p. 37 (1863).

This form is apparently less widely diffused than some of its congeners. Mr. Gould's specimens were obtained at Raines Islet, Australia, where it is said to be very abundant. There is a specimen in the British Museum, from Bristow Island, south coast of New Guinea (from which the figure Plate LXI. fig. 3, is taken); and the United-States Exploring Expedition found it breeding at Paumotu Island, where its single egg was deposited upon the bare ground instead of in a nest. There is no grey about the head or cheeks, but, with the exception of the white crown, the whole plumage is of a sooty *brown*-black; the foot is perhaps a trifle more slender in *A. tenuirostris* or *A. melanogenys*; but it is difficult to judge from dried skins.

ANOUS CÆRULEUS (Bennett).

Sterna cærulea, F. D. Bennett, Narr. Whaling-Voy. round Globe, ii. App. p. 248 (1840)—Christmas Island and other coral formations of the Pacific.

"*Sterne cendré*," Neboux, Rev. Zool. Oct. 1840, p. 291.

Sterna teretirostris, Lafresnaye, Rev. Zool. 1849, p. 242.

Procelsterna tereticollis, Lafresnaye, Rev. Zool. 1842, pl. 29 (type of *Procelsterna*).

Stolida cinerea, Néboux, Voy. Vénus, Atlas, pl. 9 (1846).

Anous cinereus, Gould, P. Z. S. 1845, p. 104; id. B. Australia, vii. pl. 46 (1848)—Norfolk I. and N.E. coast, Australia; Prévost & Des Murs, Voy. Vénus, v. p. 276 (1855); Finsch & Hartlaub, F. Centralpolynesiens, p. 239 (1867).

Anous parvulus, Gould, P. Z. S. xiii. (1845) p. 104; Cassin, U.S. Expl. Exp., Birds, p. 393 (1858)—Paumotu group.

Pelecanopus pelecanoides !, G. R. Gray, List of Birds in Brit. Mus. pt. iii. p. 180 (*fide* Gould, *ut suprà*).

Megalopterus plumbeus, Peale, U.S. Expl. Exp. p. 285 (1848).

Procelsterna albivitta, Bp. Compt. Rend. 1856, p. 773; Gould, Hand-b. B. Austr. ii. p. 420 (1865); Gray, Hand-list, iii. p. 123 (1871).

Sterna cinerea, Schlegel, M. P.-B. *Sternæ*, p. 38 (1863).

Procelsterna cinerea, Gray, Hand-list, iii. p. 123 (1871).

I have much pleasure in restoring to this well-defined species the name originally given to it by Mr. F. Debell Bennett, whose specimen from Christmas Island is described by Mr. Gould in P. Z. S. xiii. (1845) p. 104, under the name of *Anous parvulus*, in ignorance, no doubt, of the fact that Mr. Bennett had already given it a name accompanied by an excellent description. It may always be recognized by its pale grey head, neck, and underparts, and somewhat darker upper parts, the colour becoming deeper on the tail; the primaries are the darkest part; and the secondaries are broadly tipped with white, forming a distinct band. Neboux's figure is too dark; and, in spite of the yellow-coloured webs to the feet peculiar to this species, I was for some time in doubt, until I observed depicted in his plate a characteristic which distinguishes this species from all other members of the group, viz. that the *second tail-feather is distinctly the longest* on each side, whereas in other Noddies the *third* is the longest, the fourth being often but a trifle shorter. In this arrangement of the tail-feathers *Anous cæruleus* comes next to *Gygis*, and indeed is only placed here for convenience of treatment. In its range it is probably the most restricted of the family, being only found on the N.E. coast of Australia and throughout the coral formations of the Pacific as far as Christmas Island, a little to the north of the Equator. It was found breeding at Honden Island, in the Paumotu group, on August 21st, depositing a single egg in the concavities of the coral rock (*Peale* and *Cassin*); and we are told that it does not wander far from coral islands.

It is unnecessary in this paper to take notice of mere names, given by Bonaparte and others, to which no description is attached; but there are two supposed species which were unknown to Messrs. Sclater and Salvin when writing the "List of Neotropical Laridæ," and upon which the subsequent five years have thrown no light. In hope of clearing up the subject, I give the names and a brief description:—

Sterna atrofasciata, described by Philippi and Landbeck in 'Wiegmann's Archiv,' 1863, pt. i. p. 202, is an immature example of a small species, the wing being 9 inches long, the bill 1 inch long, black, red at the gape, the tarsus 7 lines, dull red, the mantle and wings dark ash-grey, and the underparts and rump white. This description does not apply to any known species; and it may prove to be a good one. The solitary specimen was shot at Llico, Colchagua, Chili, in December 1861, near the outlet of the great salt lake of Vichuquen.

S. acutirostris, Tsch. F. Peru. Aves, p. 305 (1846), is described as 10 inches long, bill nearly 2 inches, wing 6·6, tars. ·75; pure white below, pale grey above; bill black, with a red band in the middle, and tip horn-colour. It is found in the lakes of the Cordilleras, where *Larus serranus* breeds. A Tern with a bill nearly a third as long as the wing is certainly remarkable; but as, in describing *S. exilis*, Tschudi states that the *total* length is 7 inches, and the wing *alone* 7 inches 3 lines (!), his measurements are somewhat incomprehensible, and it is advisable to wait further information.

In concluding this revision I wish to acknowledge the assistance that I have at all times received in the Zoological Department of the British Museum, the Leyden Museum, from Prof. Peters of Berlin, M. Bouvier of Paris, and also from many friends who have placed their collections at my disposal. My thanks are especially due to Mr. Osbert Salvin, whose fine series of American Sterninæ has always been available, and whose practical experience has, at times, been of great assistance in intricate questions of synonymy and doubtful nomenclature.

7. Description of an apparently new Species of Owl from the Solomon Islands. By R. Bowdler Sharpe.

[Received June 16, 1876.]

(Plate LXII.)

Mr. Sclater has kindly submitted to my inspection a specimen of an Owl received by him from the Solomon Islands, which I cannot refer to any species of *Ninox* at present described. I therefore propose to call it

Ninox solomonis, sp. n. (Plate LXII.)

N. affinis N. hypogrammæ *sed minor: secundariis et cauda pallide brunneo transfasciatis et corpore subtus albido brunneo transversim fasciato distinguendus.*

Adult. General colour above chocolate-brown, the head nearly uniform and more greyish brown, with a few concealed fulvous bars on the feathers, a little more distinct on the forehead; loral plumes white, with black shafts produced into hair-like bristles over the nostrils; ear-coverts greyish brown, slightly streaked with fulvous; scapulars varied with a few white bars on the outer webs, the median and greater coverts similarly barred; primary-coverts nearly uniform dark brown; quills dark brown, barred across with lighter brown, these bars buffy white on the inner web and notched with the same colour on the outer, imparting a checquered appearance to the outer aspect of the wing; tail dark brown, barred across with lighter brown, shading off into whitish on the inner webs, the outer webs notched with the same colour, the lighter bars being ten in number not including the light brown tip; under surface of body whitish, barred across with dark brown, these bars acquiring a slight reddish tinge from a conterminous narrow rufous bar adjoining the broader brown one; sides of the upper breast more uniform brown; legs tawny with light brown cross bars; under wing-coverts white barred with rufous and brown, the lower ones white transversely barred with ashy brown and resembling the lower surface of the quills. Total length 11 inches, wing 8·3, tail 4·65, tarsus 1·2.

Hab. Solomon Islands (*Mus. P. L. S.*).

This specimen is the one recorded by Mr. Sclater (P. Z. S. 1869, p. 123) as *Athene variegata*; but on comparing it with the key to the species given by me in my 'Catalogue of Birds' (ii. p. 152), it will be found not to agree with the diagnostic characters of that bird. It is also not *N. tæniata*, the only species of *Ninox* known from the Solomons, as the upper parts of the latter are barred with fulvous, whereas in the present bird they are uniform. It is closely allied to *N. hypogramma*, but is very much smaller and has the secondaries and tail-feathers barred across with paler brown; the under surface also is white with broad transverse rows of brown, whereas the general aspect of *N. hypogramma* below is rufous.

8. On a new Species of Broadbilled Sandpiper.
By H. E. Dresser, F.Z.S.

[Received June 19, 1876.]

Having lately had occasion to examine a large series of specimens of our Broadbilled Sandpiper, *Limicola platyrhyncha* (Temm.), in order to work out that species for the 'Birds of Europe,' I found on examining examples from Siberia and China that they differ constantly from our European bird in summer dress; and as I find that there are in the series I have examined no intermediate specimens between these two forms, I think that the Eastern one, which has not hitherto been described, should be separated from our western bird; and I propose to call it *Limicola sibirica*. It differs in the summer plumage in having the feathers on the crown and entire upper parts very broadly margined with bright rufous, so as to give this colour extreme prominence, the upper parts being, in fact, similar in colour to those of *Tringa minuta* in fullest summer dress. In *Limicola platyrhyncha*, on the other hand, the general coloration of the upper parts is black, the margins to the feathers being narrow and white or ochreous white, and the crown is very dark. The underparts in *Limicola sibirica* are as in *Limicola platyrhyncha*, except that the throat is less spotted, the chin and upper throat being quite unspotted. In measurements I find no constant difference, as both species vary somewhat *inter se*; but, as a rule, the eastern bird has the wing and tarsus rather longer than in *L. platyrhyncha*. In the winter plumage the two species cannot always with certainty be distinguished; but, as a rule, the eastern one appears to be a trifle paler than the European bird. As it is hardly necessary to exhibit the large series of specimens I have had for examination, I have brought three specimens of *Limicola sibirica* in full summer plumage, which are all that I have in that dress, and two in winter dress; and for comparison I have taken at random four examples of *Limicola platyrhyncha* in summer plumage and two in winter plumage. With two exceptions, all the specimens of *Limicola sibirica* I have examined were obtained in China by Mr. Swinhoe. The following is a full description of a specimen in full summer plumage from China.

LIMICOLA SIBIRICA, sp. nov.

Capite et corpore supra pulchre ferrugineis, plumis medialiter nigris vix albido marginatis; scapularibus dorso concoloribus, alis sicut in Limicola platyrhyncha *pictis, sed pallidioribus et grisescentioribus; rectricibus centralibus nigris valde rufomarginatis, reliquis griseis vix albo marginatis; fronte et stria superciliari albis; capitis et colli lateribus dorso concoloribus sed magis griseo-albo notatis; corpore subtus albo, mento immaculato, gutture nigrofusco et ferrugineo guttato.*

This species appears to breed in Northern Siberia, and to migrate southward into China in the autumn. How far westward its range extends I cannot positively say; but there is a specimen in the Cambridge Museum sent by Mr. Blyth and stated to have been obtained in "India;" but no precise locality is given. All the other specimens from India and Baluchistan are referable to *L. platyrhyncha*. I may add that there is a specimen of *L. sibirica* in full summer dress, from Siberia, in the Cambridge Museum.

9. On a new Species of *Tetraogallus*.

By H. E. Dresser, F.Z.S.

[Received June 20, 1876.]

Mr. Charles Danford, who has just returned from the Taurus mountains with a rich collection of mammals and birds, has brought a fine series of specimens of a Snow-Partridge, which he has requested me to compare and determine. As I find it is as yet undescribed, and quite distinct from any known species, I propose to give it the name suggested by him of TETRAOGALLUS TAURICUS, as the Taurus range appears to be its true habitat.

Though allied to *Tetraogallus caucasicus*, this species is very easily distinguishable from that bird, not only by its coloration, as will be seen by the detailed description, but also by its much larger size. The following is the description of a pair selected from the series.

♀ adulta *pileo sordide cinereo-cano vix cervino tincto, versus nucham cervino cinereo; collo postico et dorso antico cervino-cinereis; corpore supra reliquo sicut in* Tetraogallo caucasico *picturato, sed pallide cervino cinereo nec saturate cinereo; alis sicut in* T. caspio, *sed tectricibus majoribus magis cæruleis et ad basin minus vermiculatis; cauda sicut in* T. caucasico, *sed pallidiore; fronte, stria superciliari, capitis lateribus et gula cervino-albis; regione suboculari pallide cano, et stria magna in colli lateribus utrinque saturate cana; gutture et pectore superiore cinereo-canis, plumis cinereo-cervino terminatis et nigro guttatis; pectore reliquo cinereo-cervino griseo-nigro vermiculato, plumis omnibus ad basin cæruleo-canis; abdomine centrali schistaceo-fuliginoso; crisso sordide cervino, subcaudalibus cervino-albis; hypochondriis cæruleo-canis, utrinque castaneo striatis et nigro marginatis, plumis nonnullis in parte suprema vermiculatis, et plumis in parte ima cinereo-cervinis nigro-cinereo vermiculatis et cervino-castaneo marginatis; rostro flavido ad basin pallidiore, naribus rufo-aurantiacis: plaga nuda circum et infra oculos læte flava: pedibus læte rufo-aurantiacis, unguibus saturate corneis: iride fusca.*

♀ *minor et sordidior; pileo vix cervino et saturate griseo notato; stria in colli lateribus et gutture antico nigro notatis, hoc griseo vermiculato; plaga nuda oculari minore; rostro et pedibus sicut in mare, sed paulo sordidioribus.*

Adult Male (Koroskeui, Taurus, 15th April, 1876). Crown dull ashy blue, with a buff tinge gradually merging into ashy buff, this latter colour pervading the hind neck and fore part of the back;

rest of the upper parts as in *Tetraogallas caucasicus*; but instead of the general tinge of colour being clear dark grey, it is lighter buffy grey; wings as in *Tetraogallus caspius*, but the larger wing-coverts are rather bluer and less vermiculated on the basal portion; tail as in *Tetraogallus caucasicus*, but rather paler; forehead, a streak over the eye, sides of head and neck creamy white, the portion below the eye pale blue-grey, connected with which is a dull darker blue-grey broad stripe down the side of the neck; entire lower throat and upper breast blue grey, the feathers tipped with ashy buff, this band on the sides of the neck becoming ashy buff and merging into the hind neck; fore part of the band irregularly but boldly spotted with black; rest of the breast to the abdomen ashy buff finely vermiculated with blackish grey, all the feathers dove blue on the concealed basal portion; centre of the abdomen sooty slate, gradually fading into dull buff on the crissum and to creamy white on the under tail-coverts; flank-feathers clear blue-grey on the centre, with a chestnut stripe on each side, and an outside margin of black, some of the feathers on the upper flanks vermiculated like the breast, and those on the lower flanks buffy ash vermiculated with blackish grey and margined with buffy chestnut; bill yellowish horn, paler at the base, nostrils orange-red; bare space round the eye and patch below the eye brilliant Indian yellow; iris dark brown; legs rich orange-red, claws dark horn. Total length about 26 inches; culmen 1·7, wing 11·8, tail 8·0, tarsus 2·6.

Adult female (Giawi-keuy, 27th April). Differs from the male in being rather smaller in size and duller in colour; the crown is slightly marked with light buff and dark grey; the stripe on each side of the neck and the band on the lower throat are more buff in tinge, the latter vermiculated with grey, and both mottled with black; soft parts as in the male, but rather duller, the bare patch behind the eye smaller in extent; and the spur on the back of the tarsus is wanting. Total length 22½–23 inches, culmen 1·4, wing 10·7, tail 7·2, tarsus 2·25.

Mr. Danford gives me the following information respecting the range of the present species.

"This bird inhabits the high ranges of the Bulgardagh and Ala-dagh in the Eastern Taurus, and probably extends westwards to the Gök mountains near Adalia, and northward and eastward by the Antitaurus and Kermes Dagh. On Argæus, the highest mountain of the country, it certainly does not occur.

"It is strictly an Alpine bird living amongst rocks and snow, and rarely descends, even in mid winter, below the limit of the tree-growth, which may generally be taken as being at an elevation of about 6000 feet. It is very shy and wary. It pairs early in the year, and in favourable situations nests about the middle of April."

I trust ere long to issue a figure of this Snow-Partridge in the 'Birds of Europe;' and Mr. Danford promises to furnish me with more details as to its habits &c. ere then.

Mr. Danford was fortunate enough to obtain the eggs of this species; and one clutch of six is now exhibited, together with an egg of *Tetraogallus caucasicus* from Kasbeck, in the Caucasus, from my own collection for comparison.

10. On an undescribed Species of Nuthatch and another Bird from Karen-nee. By Lieutenant R. Wardlaw Ramsay, F.Z.S.

[Received June 20, 1876.]

(Plate LXIII.)

I have just received from Burmah a small collection of birds made in January last in the country traversed by the recent Karen-nee-boundary expedition. Of these, two species seem worthy of note, viz.:—

1. Orocetes erythrogaster (Vig.), ♂,

which must therefore be added to the catalogue of the avifauna of that country. On the label there is nothing recorded as to where or at what elevation the bird was shot.

2. Sitta magna, n. sp. (Plate LXIII.)

General colour above dark bluish slate-colour; a black stripe, a quarter of an inch broad, on either side of the head, running from the base of the bill over the eye to the shoulder; the upper part of the head and neck between these stripes smoky grey.

Wings of much the same colour as the back. Primaries and secondaries dark brown more or less edged on the outer web with bluish slate. The second, third, and fourth primaries are slightly margined with whitish on the outer web, and, with the fifth and sixth, are white at the base. Under surface of wing greyish brown, jet-black under the shoulder.

Tail with two central tail-feathers concolorous with the back, remainder dark brown, almost black, outer pair broadly tipped with white on outer web, and margined with white on inner; next two broadly tipped with white on outer, and grey on inner web.

Under surface of body smoky grey, nearly white about throat and neck.

Lower tail-coverts, vent, and thighs brilliant chestnut, each feather of the former broadly tipped with white.

Dimensions of dry skin (male):—length 7·3 inches, wing 4·5, tail 2·7, bill from gape 1·3, bill at front 1·0, tarsus ·95.

This Nuthatch is remarkable for its great size as compared with other members of the genus.

11. Notes on a small Collection brought by Lieut. L. Cameron, C.B., from Angola. By Dr. ALBERT GÜNTHER, V.P.Z.S.

[Received June 20, 1876.]

The species enumerated in the following notes were obtained by Lieut. Cameron during his recent remarkable journey across Africa, and have been deposited in the British Museum.

MAMMALIA.

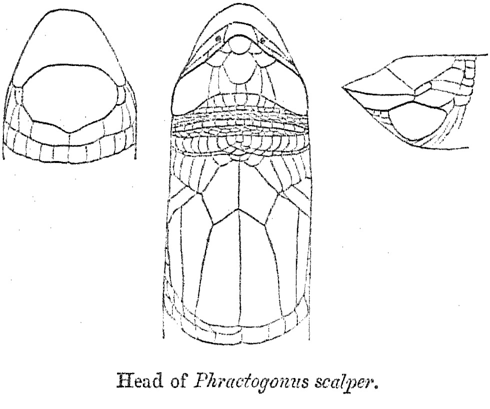
Galago maholi (Smith).

REPTILIA.

An Amphisbænian, represented by a single example, proves to belong to an undescribed species of *Phractogonus*, a genus representing in Africa the South-American *Cephalopeltis*.

PHRACTOGONUS SCALPER, sp. n.

Anterior margin of the nasal extremity hard and sharp. Of the two large plates which cover the upperside of the head, the posterior is longer than the anterior, and not quite so long as broad, bordered behind by two pairs of rather narrow scutes. Nostrils in the anterior portion of an elongate nasal; the nasals separated by a broad median upper labial. Three upper labials on each side, of which the two anterior are very narrow, linear, the hindmost being much broader. Lower lip covered by a mental, and on each side by two short small anterior and one very large posterior labial. Ocular very small, the eye being not or scarcely visible. Three pairs of elongate thoracic shields, of which the central pair is preceded by a pair of rhombic scutes of moderate size. Præanal pores none. Sixteen longitudinal series of scutes along the dorsal half, and fourteen along the ventral half of the body; the median ventral scutes are much broader than the



Head of *Phractogonus scalper*.

lateral, and much broader than long. Upper parts and tail brownish, lower white.

Total length 13 inches, the tail measuring 1 inch.

Typhlops eschrichtii (Schleg.).
Ahætulla irregularis (Leach).
Ahætulla dorsalis (Bocage).
Leptodira rufescens (Gm.).

INSECTA.

Gymnopleurus æruginosus (Harold).
Charaxes, sp. Larva.
Phymateus squarrosus.
Acridium tartaricum.
Phasma, sp.
Platypleura cameronii, sp. n. (Butler).
Occeticus, sp. Pupa-cases.

The new species of Cicada has been named by Mr. A. G. Butler, who has drawn up the following description:—

PLATYPLEURA CAMERONI, sp. n.

Purplish brown; thorax ferruginous behind, the impressions clothed with ochraceous tomentum; scutellum and abdomen blackish; costal margin of tegmina ochraceous; basal three fifths of the tegmina purplish brown, spotted with olive-brown; an oval spot in the centre of the subcostal cell; outline of brown coriaceous area sharply defined and regularly crenulated; remaining area hyaline white; three subapical large brown spots, and a submarginal series connected by a zigzag line; wings deep mahogany-brown, blackish externally, the veins paler; nerveless border hyaline white. Length 15 lines, expanse of tegmina 4 inches 6 lines.

Allied to *P. limbata* and *P. stalina*, but with the head more acuminate in front, the coloration much deeper, and the markings differently disposed and better-defined.

12. Description of a young Specimen of the *Delphinus albirostris*. By D. J. CUNNINGHAM, M.B., Demonstrator of Anatomy, University of Edinburgh. Communicated by Prof. Flower, F.R.S., V.P.Z.S., &c.

[Received June 14, 1876.]

(Plate LXIV. fig. 1.)

In September last I purchased from one of the Edinburgh fishmongers a female Dolphin, caught off Great Grimsby, which possesses characters worthy of special description.

Measurements.—

	ft.	in.
Total length in a straight line, from the point of the lower jaw to the chink of the tail	4	2
From the point of the snout to the base of the dorsal fin, following the curve of the head and back	2	1½
From the anterior part of the dorsal fin to the extremity of the tail, following the curve of the back	2	5
Girth immediately behind the flippers	2	4
,, ,, in front of dorsal fin	2	8
From the point of snout to the anterior commissure of the eyelids	0	8
From point of snout to anterior border of the root of flipper	0	11½
From the point of the snout to the blow-hole	0	8¼
From the point of snout to angle of mouth	0	6
From point of lower jaw to angle of mouth	0	6½
Anterior border of flipper	1	0
Posterior border of flipper	0	8
Girth of flipper at its root	0	9
,, ,, in middle	0	8
Extreme breadth of tail from side to side	1	1½
,, ,, from before backwards	0	5
Base of dorsal fin	0	10
Height at highest point	0	6½
From umbilicus to anterior commissure of the labia majora.	0	9

A vertical line drawn so as to divide the animal into two equal parts passed through the dorsal fin, dividing it unequally, 2 inches of its base lying in front of the line and 8 inches behind it.

Integument.—In the dorsal region the integument was of a uniform black colour, which was continued back over the dorsal fin and upper surface of the tail, and forwards over the forehead. At a short distance from the mouth this colour stopped abruptly with a sharp outline, giving place over the snout to a creamy yellow colour, this patch being deepest in front (2 inches), and gradually narrowing towards the angles of the mouth on each side, near which it ended. In front, in the middle line, a process of creamy yellow, about the breadth of the point of the little finger, and about ½ an inch long, passed upwards from the white of the snout into the forehead. The skin of the mandible, throat, and belly was creamy white. The flippers were jet-black, and the tail on its under surface was of a blackish slate-colour.

The black colour of the dorsum was not continued uniformly over the sides; but was interrupted by three white patches. Moreover the tint of black on the sides was not so deep as that over the back, being more slate-coloured. Of the white patches, one of large size (10 in. by 6 in.) was situated upon the neck, in front and above the level of the flipper. It was irregular in its outline, more or less completely divided into an upper and a lower portion by a stripe of slate-colour, and interrupted here and there by sharply defined deep-black lines and spots of small size. A slender bar of slate-colour, passing from the angle of the mouth to the root of the flipper, separated this patch from the white of the throat. The second white patch was much smaller in its area (7 in. by $2\frac{1}{2}$ in.) and not so bright in colour. It was placed at a higher level than the first, and behind it. The third patch was very large (14 in. by 4 in.), and oblong or elliptical in shape. It was placed behind the middle vertical line, and was uniform over its greater part; but as the black shaded into the white, the uniformity of the latter was broken by numerous black or dark grey streaks. It was separated from the white of the belly by a narrow but decided slate-coloured band.

Head.—The curve from the neck was uniform, but at the same time decided; and this gave the head a massive appearance. The jaws were wedge-shaped; and the lower lip projected half an inch further forwards than the upper. Traversing the white snout was a well-marked furrow or groove, which commenced at the oral fissure close to the angle of the mouth, and passed round the snout to a corresponding point on the opposite side. Its depth was greater laterally than in front; and it served to give the animal a peculiar beaked appearance. From each side of the white snout, about 1 inch above the fissure of the mouth and immediately below the furrow, *four* strong black bristles projected. They were placed in a straight line and were a $\frac{1}{4}$ of an inch apart from each other.

The blow-hole was situated almost in a straight line above the eye. It had the ordinary semilunar form, and was 1 inch in breadth. The eye was protected by well marked eyelids, the fissure between which was about $\frac{1}{2}$ inch long. Surrounding the eye the integument had a deeper black tint; and about an inch from it, it was surrounded by a faintly marked circle or ridge. The auditory aperture could not be detected.

Dentition.—In the upper jaw there were twenty-four teeth upon each side. Those in the centre of the range were the largest, and the anterior were smaller than the posterior. They commenced about $\frac{1}{4}$ of an inch from the middle line; and the first three on each side were not visible above the mucous membrane of the gum, but could be readily felt. Those of the lower jaw were twenty-six in number on each side. The first tooth was placed about $\frac{1}{2}$ an inch behind the middle line, and, with the succeeding three, was completely covered by mucous membrane. When the mouth was closed the teeth of the two jaws interlocked; but the two anterior teeth of the lower jaw had no opposing teeth in the upper jaw. They were conical in shape, sharp and curved, the concavity being towards the tongue. They were freely movable, the greatest range of movement being outwards.

General contour of body.—This is well seen in the accompanying figure (Plate LXIV. fig. 1); and it will be noticed that, instead of tapering uniformly from behind the dorsal fin to the tail, the body suddenly expands in a vertical direction and then narrows into the part from which the tail springs. This gives a sort of humped appearance to this portion of the animal; and the hump suggests the idea of a rudimentary dorsal fin. That it is so in reality is rendered very probable by the fact that in structure it is exactly similar to the dorsal fin. It is composed of the same dense, almost glistening fibrous tissue, in the meshes of which is very little oil.

The dorsal fin had a falciform posterior border; and its base was prolonged for a short distance towards the tail by a well-marked ridge. The flipper had a very characteristic appearance. The anterior and longest margin presented a uniform convex curve from the root to the tip. The posterior border was slightly concave from the tip to about the middle; here it suddenly bulged out into a convexity which extended to the root.

Vertebral column.—The vertebræ were 90 in number—7 cervical, 15 dorsal, and 68 lumbo-caudal. The atlas and axis were fused together, so as to constitute one bone, the double nature of which, however, was indicated behind by two fissures, one on each side, which partially separated the laminæ, and in front by a partial plate of cartilage intervening between the bodies. The other five cervical vertebræ were free. The transverse processes were flat, directed somewhat forwards and imbricated.

Such being the distinctive characters of this Dolphin, we must now proceed to determine the species to which it belongs.

It presents points of similarity both to *D. albirostris* and to *D. acutus* or *leucopleurus*.

D. albirostris was first figured and described by Brightwell in 1846, under the name of *D. tursio* (Fabr.), in the 'Annals and Magazine of Natural History' (vol. xvii.); but Dr. J. E. Gray, recognizing this error of nomenclature, pointed out that it was a new species, and gave it the specific name of *albirostris*. The specimen described by Brightwell was a female caught off Yarmouth, and it measured 8 feet 2 inches in length. The following is Brightwell's description:—"The colour of the upper part and sides a very rich deep purple-black. The external cuticle was of a soft and silky texture, and so thin and delicate that it was easily rubbed off. The nose and a well-defined line along the upper jaw, and the whole of the lower jaw and belly, were of a cream-colour, varied in some parts by a chalky-coloured white, contrasting beautifully with the rich black of the body. The fins and tail were of the same colour as the back." Gray[*], Lilljeborg[†], and Bell[‡], all follow this description; and it may therefore be considered the source from which they have drawn their information; moreover Gray and Bell have reproduced the figure, the former on a larger and the latter on a smaller scale. The drawing represents an animal of an entirely different mould from the Dolphin I have described. The head has not the same massive appearance, but is characterized by the great prolongation forwards of the jaws; whilst, behind the dorsal fin, the body tapers sharply and uniformly towards the caudal expansion, showing nothing of the hump or rudimentary dorsal fin which constituted such a prominent feature in the Great-Grimsby specimen. Again, the sides are deep black over their whole extent; and if we divide the animal represented in Brightwell's figure into two equal parts by a middle vertical line, we find that the anterior border of the dorsal fin lies $\frac{1}{2}$ an inch behind this line, which in the specimen itself would represent a distance of 7 inches*. In the Great-Grimsby Dolphin the middle vertical line passed through the dorsal fin, dividing it unequally, 2 inches lying in front and 8 inches behind it.

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[*] Gray, Cat. of Seals & Whales, 1866; Synopsis of Whales & Dolphins in Brit. Mus. 1868.

[†] Lilljeborg, Mem. on Cetacea, Ray Soc. 1866.

[‡] Bell, British Quadrupeds (2nd edition), 1874.

Indeed, with the exception of the white snout, the figure of this animal given by Brightwell, and reproduced by Gray and Bell, presents not a single feature in common with the Great-Grimsby Dolphin.

At first, not fully recognizing the fact that the authors I have mentioned in connexion with this species had borrowed their details from Brightwell, the original describer, and that any inaccuracy on the part of the latter would consequently be reproduced by the others, I was induced to consider the Great-Grimsby specimen a new species, and this in the face of many essential points of similarity between the skeletal peculiarities of it and *D. albirostris*. I have been deterred from doing this by my attention being redirected by Prof. Flower to another and independent account of this species by Prof. Van Beneden†. This memoir I had at first been inclined to regard as of small value, so far as my wants were concerned, seeing that it differed so greatly in its facts from the writings of the authors I have mentioned, and in whom, at the time, I was placing implicit trust, and also owing to a certain discrepancy which existed between Van Beneden's description and his accompanying figure, which made me doubtful as to the accuracy of the whole. But a more careful study of it, and looking at the plate more as a guide to the general outline of the body than as a representation of the markings, I was able to establish certain features in common between it and the specimen I have described; moreover my faith in Brightwell's description and figure has been much shaken.

The drawing given by Van Beneden shows an animal somewhat blunter about the head than that represented by Brightwell, and with a slight approach to the hump close to the tail; but then the lower lip does not project beyond the upper, and the dorsal fin lies altogether in front of the middle vertical line, which corresponds to its posterior margin. The markings are also peculiar and do not in every respect agree with the accompanying letterpress description.

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* The animal measured 8 feet, whilst in the drawing it occupies a space of 7 inches; $\frac{1}{2}$ an inch in the latter therefore would be equal to 7 inches in the specimen itself. But this does not agree with the accompanying letterpress, in which it is stated that from the tip of the nose to the dorsal fin the animal measured 3 feet 5 inches, and that the base of this fin was $11\frac{1}{2}$ inches long. According to these measurements, therefore, 8 inches of the fin must have been in front of, and 3 inches behind the middle vertical line. In reproducing the drawing Gray must have noticed this inaccuracy and adopted a middle course; for in his figure the dorsal fin lies immediately behind the middle vertical line; and this is the only respect in which his plate differs from Brightwell's.

† Van Beneden, "Recherches sur les Cétacés," Nouv. Mém. de l'Acad. R. de Bruxelles, t. xxxii. 1862.

The white of the snout passes up so as to encircle the eye; a faintly marked streak passes in a horizontal direction from above the eye along the flank, and ends in front of the dorsal fin, whilst the body behind the dorsal fin appears to be white.

Van Beneden's own description of the Dolphin, which is framed from an examination of two female specimens caught by the fishermen of Ostend, one of which measured 7 feet in length, is as follows:—"The head is prolonged into a sort of beak. From the base of the beak, the head, the back, all the dorsal fin, the base of the tail and upon the side, to the middle of the flanks, the skin is of a beautiful black; also the caudal fin and a great part of the pectoral fin. The beak, or that part of the snout which rises abruptly, is of a yellowish white. The entire lower surface of the body is of a shining white. But what, in the markings, seems to characterize this species best, independently of the pale colour of the beak, is a white band which stretches upon the sides parallel to the vertebral column, commencing above the eyes and becoming lost, below the anterior border of the dorsal fin, in the white colour of the abdomen. It follows from this that the body is white below, upon the side of the abdomen and tail, and that an equally white band is present upon the side of the back." Then in the following page he states that "the lower jaw projects almost an inch beyond the upper."

But this description does not agree with the plate which accompanies it. As I have mentioned, the latter represents an animal in which the whole posterior part of the body is of a light colour, and in which the jaws are of equal length *, whilst in the letterpress (p. 28) we find it clearly stated that "the back, dorsal fin, and caudal fin are of a beautiful black," and that the lower jaw projects an inch beyond the upper. The author makes no reference to the position of the dorsal fin; and we are therefore left to infer its situation from the drawing.

The memoir also contains an elaborate account of the skeletal peculiarities of this species. The vertebræ are from 90 to 94 in number; and the atlas and axis are anchylosed, whilst the other five cervical vertebræ are free and possess thin overlapping transverse processes.

He states that in both specimens the dentition was $\frac{25}{25}$; Lilljeborg quotes it as $\frac{26}{27}$, Gray as $\frac{25}{24}$, and Brightwell as $\frac{24}{23}$.

Now as it appears to me that Van Beneden's account of *D. albirostris* is the most reliable, I purpose making it the standard with which to compare the Great-Grimsby Dolphin, in order to determine whether or not it belongs to this species. But in making this comparison, it must be borne in mind that the semicartilaginous state of some of its bones, the characters of the skull, and the bristles on the snout, all contributed to show that the Great-Grimsby specimen had not nearly reached adult life.

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* I do not refer to the drawing of the skull, which he also gives. This shows a greater length of the inferior than the superior jaw.

The characters of the skeleton are almost identical in both. Thus the present specimen agrees with *D. albirostris* in the number of the vertebræ and in the peculiarities of the cervical vertebræ. There are, indeed, a few points of difference to be detected in the skull; but these are of minor importance and probably merely the differences of youth and age.

The differences of import are to be found (1) in the character of the markings, (2) in the general shape of the body, (3) in the position of the dorsal fin. I consider, however, that the extreme youth of the specimen may account for the first two of these dissimilarities. The discrepancy in the markings is not great, and consists chiefly in the white patches on the side being more strongly pronounced and more distinctly separated by the black. Then as regards the difference of shape, we know that a massive head, or a head large in proportion to the rest of the body, is a peculiarity of youth in many animals. The position of the dorsal fin in relation to the middle vertical line, however, is a difficulty not so easily got over; we can scarcely suppose that as the Dolphin advances in age, the dorsal fin advances upon the back, at least to such an extent as to lie entirely in front of the middle vertical line. But the drawing of Van Beneden is the only guarantee that we have of its position in front of this vertical line; and as we have already seen this to be in fault in one or two particulars, it is not improbable that it is in error in this respect also.

I believe, therefore, that I am justified in regarding the Great-Grimsby Dolphin as a young specimen of the *D. albirostris* as described by Van Beneden.

An interesting feature in the case, however, is the striking resemblance in external characters which this Dolphin presents to the *D. acutus* of Gray *. In both there is the same general outline of body, massive head, and humped appearance close to the tail; and in both the sides are piebald, the markings, however, differing in character. Here the similarity ceases; and in skeletal peculiarities they diverge widely from each other. The *D. acutus* has 80 or 82 vertebræ; and in the cervical region the first four are ankylosed together, the first three completely, the fourth simply by its spinous process. In the Great-Grimsby specimen, as we have seen, the vertebræ numbered 90, and in the cervical region the atlas and axis alone were fused together. These characteristics, in conjunction with the white snout, are sufficient to show that the Dolphin I have described could not be considered referable to *D. acutus*.

It will not be inappropriate to conclude this communication with a brief summary of the various localities in which the recorded specimens of *D. albirostris* have been captured; and in this way an idea of the geographical distribution of the species may be obtained.

D. albirostris is a native of the North Sea, but is also found in the Baltic. Eschricht states that it appears regularly in Davis's Straits in the wake of migratory fish, at the time when the Beluga and Narwhal leave their winter quarters for the Polar regions.

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* Gray, Spicil. Zool. 1828; Rasch, Nova Species Descripta cum tabulis ii. 1843; Duguid, Ann. and Mag. Nat. Hist. vol. xix. 1864; Schlegel, Abhandl. Zool. &c. 1841, tab. i. & ii. fig. 4, tab. iv. fig. 5.

The following table shows the localities in which it has been caught.

	Coast of England.
South Coast	A male in 1871. Its anatomy was described by Dr. Murie (Proc. Lin. Soc. 1871). Skeleton in Brit. Mus.
Coast of Norfolk.	
Yarmouth	A female (described and figured by Brightwell Ann. and Mag. Nat Hist. vol. xvii. 1846). Skull in Brit. Mus.
Cromer	Specimen shot by Mr. Upcher (Ann. & Mag. Nat. Hist. vol. xviii. 1866). Skull in British Museum.
Lowestoft	Specimen captured a few weeks ago. In the possession of Mr. J. W. Clark of Cambridge.
Great Grimsby	Young female, now described. Skeleton in Edin. Univ. Museum.
Hartlepool	First recorded specimen, 1834. Skull in Cambridge Museum.
	Coast of Belgium, Denmark, Norway, and Sweden.
Ostend	Two females, described by Van Beneden (Nouv. Mém. de l'Acad. Brux. t. xxxii. 1861).
Kiel	Two specimens, one of which furnished to M. Claudius the subject of his memoir entitled "Dissert. de Lagenorhynchis" (Kiliæ 1853).
Bergen	One specimen. Skull in Museum there.
Gullholmen	Two pregnant females. Skeleton of one preserved by F. A. Smith, Acad. Docent., and now in the Museum of the Univ. of Upsala.
Skanör	One stranded. Lower jaw in the Zoological Museum of the University of Lund.

Specimens have also been seen off the Färoe Islands.

In conclusion my best thanks are due to Mr. J. H. Scott, Demonstrator of Anatomy, for the accurate water-colour drawing which he executed of the Great-Grimsby Dolphin. It is from it that the accompanying figure (Plate LXIV. fig. 1) is taken.

13. Notes on a Dolphin taken off the Coast of Norfolk.

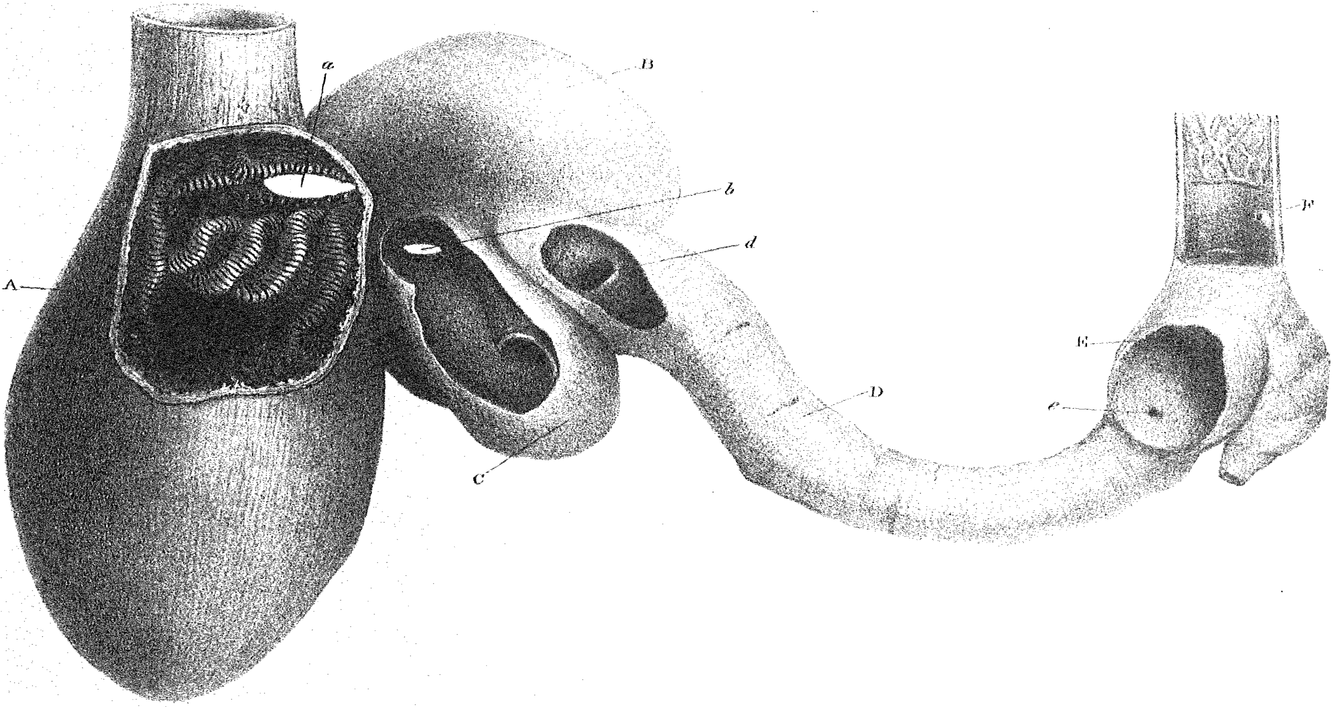
By J. W. Clark, M.A., F.Z.S.

[Received June 20, 1876.]

(Plate LXIV. fig. 2 & Plate LXV.)

On the 26th of March in the present year a large Porpoise was caught by some fishermen off Lowestoft. It was fortunately secured for me on the same day, and despatched to Cambridge. The men who captured it called it a White-beaked Bottlenose.

The animal was a male, and, as was discovered afterwards by the condition of the bones, quite young. The weight was 139 pounds.



J. Smit lith.

STOMACH OF DELPHINUS ALBIROSTRIS

Hanhart imp.

The principal dimensions were as follows:—

	ft.	in.
Length, from anterior edge of upper lip to notch in middle of caudal fin	5	5½
From upper lip to posterior edge of blow-hole (following curve)	0	11
From upper lip to anterior edge of dorsal fin (following curve)	2	6
From anterior edge of dorsal fin to notch in middle of caudal fin (following curve)	3	4
Length from upper lip to notch in middle of caudal fin (following curve)	5	10
Height of anterior edge of dorsal fin (following curve)	0	10¾
Total vertical height of the same	0	6
From upper lip to junction of anterior edge of pectoral fin with the body	1	2½
From tip of snout to navel (marked by a black V-shaped spot ⅞ inch long)	2	6
From tip of snout to pudendal orifice	3	0¾
From tip of snout to anus	3	10
From upper lip to angle of mouth	0	7⅝
From upper lip to anterior angle of eye	0	9¼
Length of eye-aperture	0	0¾
From posterior angle of eye to ear-aperture	0	1¾
From angle of mouth to anterior angle of eye	0	1¾
Pectoral fin, length from junction of anterior edge with body to tip	1	0
Pectoral fin, from junction of posterior edge with body to tip	0	7¾
Pectoral fin, breadth at base	0	5
Pectoral fin, greatest breadth	0	4½
Breadth of caudal fin across the flukes	1	3
Vertical height of body, at the eye	0	8¾
„ „ „ immediately behind the pectoral	0	11
„ „ „ immediately in front of the dorsal fin	0	11¾
Width between the pectorals	0	5¾

Behind the dorsal fin the body becomes rapidly compressed, as will be seen from the accompanying figure.

	inches.
At 8½ inches behind the dorsal fin, the width was	5
At 16¼ „ „ „	2¼
At 21¾ „ „ „	1½

The vertical height at the first position was 8 inches, at the second 6¾ inches, and at the third 3½ inches. The line of the back sloped gradually to the caudal fin; the ventral line, at a point 10 inches distant from the central point of the fin, turned upwards rather abruptly and suddenly.

The front part of the head was rounded between the eyes; but the upper lip was separated from this by a deep furrow on either side, and projected forwards exactly like the peak of a cap. The lip was 2 inches broad at its extreme anterior point, where the furrows are ¾ inch apart, separated from each other by a ridge, and it narrowed gradually to a breadth of half an inch at the angle of the mouth. At a distance of 1¼ inch from the tip of the upper lip were four minute black bristles on either side, set in a line parallel to the lower edge of the lip, and a quarter of an inch apart. The longest of these measured one sixteenth of an inch.

The crescentic aperture of the blow-hole, 1⅛ inch in width, was placed directly over the eyes.

The general form of the animal will be best understood from the figure (Plate LXVI. fig. 2), taken partly from a photograph and partly from notes and measurements made by myself. The coloration was singularly beautiful, and I fear that no drawing can give any adequate idea of it.

The upper part of the body generally was a glossy black, and the under a creamy white. The upper lip (before described) was white, with a black spot at the tip, and a few irregular pale grey cloudings on its surface. The convex forehead was at first white for half an inch on the right side, and a quarter of an inch on the left; this white space was bounded by a wavy line of black spots of different dimensions, including a subtriangular space of a brownish colour, 2 inches broad, dotted with darker spots.

Immediately behind the blow-hole was an ogee of black, 1⅛ inch deep, succeeded by a space of light brown colour 8½ inches wide by 9 inches deep. Beyond this the whole upper surface of the body was black till about 18 inches from the tail, when it became grey. At a point 10 inches from the centre of the tail this grey ceased, and the tail became black above and below. The underside of the caudal fin was irregularly streaked with grey; and there was a white spot on the raphé.

Behind the eye and just above the pectoral fin was an irregular patch of light yellowish-brown flecked with numberless spots and dashes of brown of more than one shade, with an occasional black mark. There was a long narrow band above this and between it and the dorsal fin, sparingly spotted; and a second space, marked like the first, commenced at about the middle of the band and extended backwards to a point halfway between that and the tail. The markings upon both of these cannot be better described than by comparing them with those upon a sheet of blotting-paper that has been much used. They were thickest at the sides of the space, of which a small portion, just in the centre, was free from markings altogether. Between these spaces the black was less intense; a band of it, however, extended between the second space and the white of the belly.

The pectorals were black above and below; and a few grey markings, which maintained a uniform width of about 6 inches, extended beneath them over the white undersurface of the body, till at the anus the dark grey colour of the sides curved downwards and narrowed the white to less than half its width. Behind the anus there was a patch of light brown about 6 inches long, succeeded by black as described above.

Skeleton.—The condition of the bones when macerated showed at once that the animal was a very young one. All the epiphyses were distinct; the transverse processes of the ribs and the terminal cartilages of the scapulæ were unossified; and the bones themselves were quite soft and spongy.

The total number of vertebræ is 90 or 91, which may be divided into 7 cervical, 14 dorsal, 24 lumbar, and 45 or 46 caudal. These latter are difficult to count accurately, as the last of the series are mere specks of cartilage.

The first two cervical vertebræ are ankylosed; the remaining five are free. These have each a superior and an inferior transverse process, with the exception of the seventh, in which the inferior process is absent. These processes are directed forwards and overlap each other. Those of the fifth vertebra are the least developed. The superior process of the seventh is extremely large, and overlaps those of the fourth, fifth, and sixth completely.

There are fourteen pairs of ribs. The first six have long necks, reaching in each case to the articular surface on the side of the vertebra in front of that to which the tubercle is attached. At the seventh the necks cease suddenly, and it and the remaining ribs are attached by their tubercles only to the transverse processes of the vertebræ. This attachment becomes less and less close till the fourteenth rib is reached, which is attached by ligament nearly an inch in length to the transverse processes of the fourteenth and fifteenth thoracic vertebræ.

There are nine pairs of sternal ribs. The first pair articulate to a facet upon the centre of the wings into which the sides of the first segment of the sternum is expanded; the second at the junction of the first and second segments of that bone; the third at the junction of the second and third segments; and the fourth, fifth, and sixth to the hinder end of the third segment.

The spines of all the thoracic vertebræ are well developed and inclined backwards. This inclination gradually diminishes. The tenth vertebra has an absolutely vertical spine, as have all the lumbar vertebræ. In this portion of the column they are of great height, with well-developed metapophyses. The spines reach their greatest height at about the thirty second vertebra (counting from the first cervical), and cease at the seventy-fourth.

The characters of the skull could not be ascertained, as it has not yet been sufficiently macerated. It measured 14½ inches from the occipital condyles to the tip of the beak, which was 3 inches wide at the termination of the dental series. Length of dental series in a straight line 5½ inches. Dental formula $\frac{23-23}{26-23}$. Unfortunately the lower jaw was carelessly macerated, and some of the teeth had fallen out, so that it was impossible to count them accurately; but probably twenty-six might be set down as the number on both sides of the lower jaw. The teeth are all conical, recurved, sharp; those at the tip had not yet passed the gum.

Viscera.—The tongue measured 6 inches in length by 2 in width. The tip was a sharply pointed triangle, on each side of which for a distance of nearly 2 inches it was deeply fimbriated. Some of these fimbriations were a quarter of an inch in length. Near the base were the orifices of numerous glands and several black spots.

The stomach (Plate LXV.) differs somewhat both from that of the Porpoise (*Phocæna vulgaris*) and that of the Pilot Whale (*Globicephalus melas*) described and figured by Prof. Turner[*].

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[*] Journal of Anatomy, vol. ii. p. 72.

The œsophagus leads directly into a pyriform sac (A) about 7 inches deep. There was no sudden line of demarcation between the œsophageal and gastric mucous membranes; but that of the œsophagus seemed to be carried on into the gastric cavity, where it was disposed in irregular folds, which were thickened and twisted across the floor of the opening (*a*) into the second stomach (B). This is nearly spherical, 4 inches in diameter, and lined with very soft and delicate mucous membrane, puckered into wavy folds almost like the cells of a honeycomb in shape.

At a distance of little more than half an inch from (*a*) a second opening (*b*) led into the third stomach (C), which is long and narrow, with very thin walls, and returned upon itself so that the second portion, which is separated from the first by an incomplete septum, is nearly parallel to the first. It leads by an oval opening (*d*) into the long and narrow cavity (D), 7 inches in length, which communicates by an orifice scarcely wide enough to admit a large pin with the expanded duodenum (E). Into this the hepatic and pancreatic ducts open at the summit of a papilla, three inches from the above-mentioned orifice. Immediately beyond this the intestine proper commences.

The rest of the viscera do not present any peculiarity. The brain was too soft to admit of examination.

I may mention that I could find no trace of any parasites. The same peculiarity is mentioned by Prof. Van Beneden in his description of what I think must be an individual of the same species.

The external characters of this animal show plainly that it must be referred to the genus *Lagenorhynchus*; and the number of its vertebræ and ribs, together with the condition of its cervical vertebræ, would determine it to be *L. albirostris*, were it not for the peculiarity of its colouring. This differs somewhat remarkably from the examples recorded by Dr. Brightwell, Prof. Van Beneden, and Mr. Moore.

The first two of these descriptions have been so fully discussed by Dr. Cunningham that I need not allude further to them, except to mention that Dr. Brightwell's was a male, and Prof. Van Beneden's both females. All three were apparently adult.

Mr. Moore's specimen was taken at the mouth of the Dee, Dec. 29, 1862. It was a male, 9 feet long, and therefore adult like the others. His description, which agrees fairly well with our specimen, is as follows:—

"The general colour is a rich black. A long and narrow greyish streak extends on either side diagonally across the ribs; and a similar greyish hue occurs on each side of the dorsal ridge, extending nearly from the fluke to the tail. The beak white, irregularly blotched with blackish, the white extending slightly above the constriction of the beak. The under jaw and throat milk-white, which colour extends along the belly, but becomes less clear as it approaches the vent"*.

The descriptions agree in representing the whole of the underside of the body, the lower jaw, and the upper lip as white; and Van Beneden's figure shows a patch of light grey behind the eye. His figure, making allowance for age, might well serve for that of our animal, as the lighter grey which prevails between the caudal and dorsal fins might easily become pure white when adult.

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* Ann. & Mag. Nat. Hist. ser. 3, vol. xi. p. 269 (1863).

The figure and description that diverge most are those of Dr. Brightwell. The black colour is described as extending over the whole upper surface of the body in his specimen. This might, however, be an individual variation.

On the whole, in the absence of a larger series of specimens for comparison, I am disposed to agree with Dr. Cunningham, and conclude that my specimen is, like his, a grey *Lagenorhynchus albirostris.*

EXPLANATION OF PLATES LXIV. & LXV.

PLATE LXIV.

Fig. 1. *Delphinus albirostris*, from Great Grimsby, see p. 679. From a sketch by Mr. J. H. Scott.

2. *Delphinus albirostris*, from Lowestoft, see p. 686. Reduced from a photograph and a figure drawn by Mr. J. W. Clark.

PLATE LXV.

Stomach of *Delphinus albirostris* (Lowestoft specimen), two-thirds of the natural size. A, first stomach; *a*, opening into second; B, second stomach; *b*, opening into third; C, third stomach; *d*, opening from C into the long cavity D; E, duodenum; *e*, orifice opening into it; F, opening of pancreatic and hepatic ducts.

14. Notes on the Anatomy of certain Parrots. By A. H. GARROD, M.A., F.R.S., Prosector to the Society.

[Received June 19, 1876.]

Since the publication of my paper "On some points in the Anatomy of the Parrots," in the 'Proceedings' of the Society (1874, p. 586), I have had the opportunity of dissecting several species, some of which, from their peculiarities, deserve special note. They are the following:—

1. *Dasyptilus pecqueti.* It is through the great kindness of Dr. A. B. Meyer that I have had the advantage of being able to dissect this extremely rare bird. Dr. Meyer obtained the specimen in New Guinea, and has preserved it in spirit, entire. He has most liberally allowed me to determine those anatomical points to which I have drawn attention in the paper above referred to.

There are two carotid arteries; the left, however, runs superficially as in the Psittacidæ (as defined by me). The oil-gland is large, subglobose and possesses a well-developed tuft of shortish feathers around its orifices. The rectrices are twelve in number.

In its myology and osteology it agrees with the Pyrrhurinæ in entirely wanting the ambiens muscle, and in having a furcula, which bone is not large or powerful, nor so slender as in the Lories.

The orbital ring is incomplete, the eye not being encircled by bone. The femoro-caudal muscle is large; and the semitendinosus with its accessory head are well developed,—in which arrangements it agrees with all the Psittaci.

The intestines are 17¼ inches long, there being no trace of cæca. The liver-lobes are somewhat unequal in size, the left being the smaller. The stomach is small and much like that in the Fruit-eating Parrots generally. The proventriculus forms a dilated sac, of which the walls, instead of being, as is usually the case, thick and glandular, are strikingly thin, at the same time that no glands are visible.

Dr. Meyer has already* given a short description of the peculiarities of the tongue, and, in writing to me, tells me that he has further observations to make on the same.

As in nearly all birds, the main artery of the thigh is the sciatic, whilst the vein is the femoral.

There is a fenestra near the posterior margin of the sternum, on each side.

2. *Deroptyus accipitrinus.* A Brazilian specimen of this rather peculiar genus from the Society's collection has the two carotids arranged as in *Dasyptilus*, the left being superficial. The furcula is of fair size, the orbital ring incomplete, the oil-gland well tufted, the ambiens muscle absent.

3. *Polyteles barrabandi* possesses two carotids, normally situated—in other words, side by side in the hypapophysial canal. The furcula is small and slender. The oil-gland is decidedly large, and well tufted. There is no ambiens muscle. The intestines measured 40 inches.

4. *Chalcopsitta scintillata* has the two carotids normally situated, a small furcula, a small tuft to the large oil-gland, and no ambiens muscle. The intestines measured 37 inches.

5. *Coryphilus fringillaceus* has the two carotids normal, the furcula small and slender, no ambiens muscle, and a well-tufted oil-gland. This specimen was kindly given me by Canon Tristram, carbolized and dry.

Of genera which have already passed through my hands I have had the following additional species:—

Ara militaris.
Cacatua moluccensis.
—— *philippinarum.*
Eclectus grandis.
Eos reticulata.
Licmetis tenuirostris.
Lorius domicilla.
Pœocephalus meyeri.
Tanygnathus albirostris.

They all agree with those species previously dissected, except *Licmetis tenuirostris*, which has only one carotid, the left, whereas *L. pastinator* has two. It will be interesting to verify this difference between the South-Australian species and its more western ally; for the uncertainty of the disposition of these vessels in the Cacatuinæ is rendered more striking if it is correct.

In the specimen dissected, of *Cacatua philippinarum*, a gall-bladder was present. This is the only case in which I have seen this viscus in any Parrot.

Formulating the varying characters of the above newly dissected genera upon the principle adopted in my earlier paper and there explained, the formulæ run thus:—

(1) *Dasyptilus* 2.—.+.+.
(2) *Deroptyus* 2.—.+.+.
(3) *Potyletes* 2.—.+.+.
(4) *Chalcopsitta* 2.—.+.+.
(5) *Coryphilus* 2.—.+.+.

Such being the case, *Dasyptilus* and *Deroptyus* fall into my subfamily Pyrrhurinæ, whilst the other three must be placed with the Palæornithinæ. It is interesting to notice that *Deroptyus* agrees with *Pyrrhura*, and not with *Conurus*.

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* Mittheil. aus dem k. zoologischen Museum zu Dresden, 1875, p. 14.

November 7, 1876.

Prof. Newton, F.R.S., V.P., in the Chair.

The Secretary read the following reports on the additions to the Society's Menagerie during the months of June, July, August, and September 1876:—

The total number of registered additions to the Society's Menagerie during the month of June was 156, of which 56 were by birth, 44 by presentation, 35 by purchase, 19 were received on deposit, and 2 by exchange. The total number of departures during the same period, by death and removals, was 149.

The most noticeable additions during the month of June were as follows:—

1. Four Galapagan Tortoises (*Testudo elephantopus*), two of which were deposited by Sir C. Wyville Thomson, on the 7th of June, and two by Commander Cookson, R.N., on the 10th of June. These Tortoises were obtained by Commander Cookson, of H.M.S. 'Peterel,' under the circumstances stated in the letter read at the last Scientific Meeting of the Society, at Albemarle Island, Galapagos group. There is great interest attached to these large Tortoises, now almost extinct; and we have to thank Dr. Günther for arranging for the deposit of the living specimens in the Gardens.

The following are the present measurements of these animals:—

Sex.	Weight.	Length.		Breadth.		Received from
	lb.	ft.	in.	ft.	in.	
♂	273	3	3	2	4	H.M.S. 'Peterel.
♀	101	2	4½	1	10	,, ,,
♂	104	2	1	1	7½	H.M.S. 'Challenger.'
♀	23½	1	3	1	0	,, ,,

2. Three Crows from Fao, one of the telegraph-stations at the head of the Persian Gulf, presented by Mr. J. Huntley, in medical charge of the station, June 16th. These Crows apparently belong to an extreme form of the Hooded Crow (*Corvus cornix*), which I have never previously seen, the whole body-colour, except on the head and neck and wings, being of a pure white. Mr. Huntley writes to me as follows:—"A white crow, usually referred to as a wonder, especially in the East, is far from uncommon here. Doubtless you are familiar with its existence, though not a British bird. Deeming it a novelty, I have ventured to send three of them to your address, by kind favour of the Commander of the British Steam-Navigation Company's steamship 'Assyria,' which vessel is due in London about the 8th of June next. The bird is one bearing all the characteristics of the Hooded Crow, with the exception of its white feathers, which, from their resemblance to a surplice, have caused me to designate it the Chaplain Crow."

I propose to call this apparently new Crow the "Chaplain Crow" (*Corvus capellanus*), with the following characters:—

CORVUS CAPELLANUS, sp. nov. (Plate LXVI.)

Albus: capite undique, cum gutture producto, alis, cauda et tibiis nigris: plumis dorsi et pectoris linea mediana tenuissima nigra ornatis: rostro et pedibus nigris: forma C. cornicis *sed crassitie paulo majore et pedibus robustioribus.*

Hab. Arabia Turcica, ad ora Sinûs Persici.

3. Two Tiger cubs (*Felis tigris*), presented June 20th, by Dr. Marchant Jones. Dr. Marchant Jones has, at my request, most kindly procured this fine pair of Tiger cubs from the neighbourhood of Amoy, China, the Chinese form of this carnivore having been previously unrepresented in our series. Dr. Marchant Jones writes to me that these specimens were obtained at a place called Tang-wah, about 10 miles from Amoy, where the neighbourhood "abounds with tigers of a very large kind, bigger and with longer fur than the Indian variety."

4. A Gerrard's Squirrel (*Sciurus gerrardi*, Gray) from Cartagena, purchased June 24th. This Squirrel, which was described and figured by the late Dr. Gray, in the Society's 'Proceedings' in 1861 *, from specimens in the British Museum, is new to the Society's collection.

5. Four small Flying Phalangers of the genus *Belideus*, procured by Mr. Octavius C. Stone, F.R.G.S., during his recent expedition into the south of New Guinea, and received June 28th. These Phalangers are closely allied to *Belideus breviceps* and *B. ariel* of Australia, and, if different, are probably new to science. But it is not possible to distinguish them in the living state.

6. The female Sumatran Rhinoceros (*Rhinoceros sumatrensis*) deposited in the Gardens by Mr. C. Jamrach, on the 14th July 1875, and which has now been purchased for the sum of £600.

We have therefore now five Rhinoceroses in the collection, belonging to five different species, forming a unique and unparalleled series of these animals.

The registered additions to the Society's Menagerie during the month of July were 203 in number; of these 44 were acquired by presentation, 89 by purchase, 5 by exchange, 55 by birth, and 10 received on deposit. The total number of departures during the same period by death and removals was 91.

The most noticeable additions during the month were:—

1. A pair of the Black-backed Goose (*Sarcidiornis melanonota*) of India, purchased July 5th.

The arrival of these birds has afforded us the much-wished-for opportunity of comparing the Indian and American forms of *Sarcidiornis*, concerning the distinctness of which there has been much controversy.

Of the American form we have three examples, purchased at pedition, which, as I learned afterwards, is supported by extensive aid from the Russian Government. Colonel Przewalsky has been, as is well known, collecting very successfully in Thibet. I had the pleasure of seeing a good part of his collections in St. Petersburg, now incorporated in the fine Museum of the Academy of Sciences; and I must say that I have rarely seen more interesting collections. Colonel Przewalsky had the good fortune to bring home specimens of the wild Yak (*Bos grunniens*), which is indeed a most beautiful and huge animal, totally unlike the specimens in our Zoological Gardens. Besides, I was pleased to see fine specimens of *Kemas hodgsoni*, *Antilope picticaudaia*, and, above all, especially as an ornithologist, examples of many fine and undoubtedly new species of birds.

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* See P. Z. S. 1861, p. 92, pl. xvi.

"When in the Arcad Mountains, 150 versts above Semipalatinsk, where we made a successful hunt after *Ovis argali*, we became acquainted with Mr. Kamensky, a gentleman who is fitting out a large expedition, half mercantile and half scientific, to China, in order to open the route traversed by Colonel Lassnowsky from Pekin to the frontier of Russia by Saissan. After reaching this latter place by way of Tschugutscheck, conducted by Major Tichannoff, we obtained more notices as to the occurrence of the Camel wild. Mr. Harkloff, an intelligent merchant, who has long resided in Saissan, and has made many trips into Northern China, told me the following on this subject, mostly based upon the reports of native Tanguts, as Mr. Harkloff had never had the opportunity of seeing the wild Camel himself:—'The wild Camel has two humps; the size is nearly the same as that of the tame; but it is larger and higher on the legs. It is of a darker colour than the tame; and the white around the nose is much clearer and paler. The wild Camel is to be found 250 versts south-east from Saissan, in the district of Kabano (*i. e.* bloody hill), part of the desert of Gobi. In the spring they pair; and the time of gestation is the same as with the tame Camel. The Tanguts and Kirgizes hunt the wild Camel and eat its flesh; also they use the hair. The wild Camel is said not to be shy, and accordingly not difficult to obtain. Amongst the wild Camels live a species of Kulan, different from the common *Equus onager*, of a pale yellowish colour, which is known by the Tanguts under the name of "Surtaga."'

"Major Tichannoff had also the kindness to inquire on this subject of an intelligent and experienced Kirgiz, who reported as follows:—

"'The Kirgizes hunt and eat the wild Camel; it is not to be tamed. It lives in the western part of the High Gobi, called Kanaba, about 200 versts from Saissan.

"'According to an old legend, there was a rich Kirgiz, who had so many camels and horses in his possession that he was unable to take care of them. A great quantity escaped, the camels became wild, and the horses became Kulans.

"'The wild Camel is much larger, higher on the legs, and has a much finer and softer wool than the tame kind; it runs faster than the Horse; it is of a red-brown colour, darker than the tame. The weight is about 40 to 48 pud; and it requires four tame Camels to transport the body of a wild one. The voice is not so strong as that of the tame Camel. The female produces in February or the beginning of March, one calf, rarely two, and bears young every year, whereas the tame Camel brings forth only every two years. The flesh of the wild Camel is much appreciated by the Tanguts, and they hunt the animal with great zeal.'

"The Kirgiz who told us this assured us he had seen wild Camels himself when travelling with Tanguts through the Gobi to Kuldschen. He had often tasted the flesh, which he found sweeter than that of the tame.

"Mr. Harkloff, who takes great interest in natural history, has promised to send me the skin and skull of the wild Camel, as he was sure to be able to obtain them."

A letter was read from Mr. E. Pierson Ramsay, C.M.Z.S., containing the following notes on the habits of some living *Ceratodi* in the Australian Museum, Sydney:—

"You, among others, will perhaps be very glad to hear that I have at last succeeded in landing some *Ceratodi* alive here. At present they are doing well, and afford me great satisfaction in watching their movements in the large tank in which they are placed. I should like to write a long paper on them, but have too much on my hands to attempt it at present.

"It is now winter-time here, and very cold; so that the *Ceratodi* are not so lively as they might be, and appear to be too lazy to get out of the way when about to be handled.

"Their chief mode of progression is by waves of the tail, or by paddling with the pectoral fins alone (without either moving their posterior pair of fins or the tail). When at rest on the bottom of the tank, the pectorals are placed at nearly right angles to the body, the posterior fins lying parallel to the tail. If not disturbed, they will remain in this position for hours, and only when stirred up think it necessary to use their fins and tail at all. They then lash out with their great strong tail, and, turning sideways, squeeze in between some tufts of grass.

"I have tried to make them progress in only a few inches of water, but (as far as I have yet seen) without effect. They are exceedingly eel-like in their motions; and when going slowly along, the swaying of the great caudal fin gives them a serpentine course. I do not think they could go forward in a straight line unless swimming very fast or very slowly at the bottom: when they do this they do not use the tail at all, but depend on their pectoral fins.

"They are of a light olive-brown colour (some darker than others) above, and of a pale fleshy pink below. The eyes have a yellowish tinge when looked at sideways; but the iris is of a dull lead-brown colour. They feed on worms and water-weeds, *Lymnææ* and *Physa*, *Cyclas*, *Anodon*, &c.

"I am beginning to doubt their ever going *quite* out of the water to 'graze,' as has been reported, for the simple reason that they are too bulky to progress by their fins, and not long enough in the body to go eel-fashion. At any rate, they decidedly object to be kept any length of time out of the water: they put up with it for a few minutes, but then begin to plunge about so that I am always glad to get them back again into the water, fearing that they may injure themselves.

"I am indebted to Mr. B. Travis, of Maryborough, and to my brothers, Messrs. John and Percy Ramsay, for these specimens."

Mr. W. K. Parker, F.R.S., read a memoir "On the Structure and Development of the Skull in Sharks and Rays," of which the following is an abstract:—

"The materials for this paper have been kindly given me by my friends Mr. Henry Lee, and Mr. F. M. Balfour: the former obtained them from the aquarium at Brighton, and the latter from that at Naples.

"The illustrations of the Shark's skull are from embryos and adult specimens of the Lesser Spotted Dogfish (*Scyllium canicula*); the Skates were of three species, namely *Raia maculata*, *R. clavata*, and a species of *Pristiurus*; the smallest embryo of the Ray was of this last kind; this and the smallest *Scyllium canicula* were two thirds of an inch in length.

"The structure of the cranium proper and the facial arches has been worked out, from their first differentiation in the smallest embryos up to their adult condition. The Selachians present a curious and instructive problem in the skull, inasmuch as they only have the cartilage of which it is composed hardened superficially by tesseræ of calcified cell-patches, and the dermal bones ('placoid' grains and spines) are not modified in relation to the endoskeletal parts.

"Also we see that in these types the cranium and facial arches are more developed, as to mass in the former, and as to subdivision in the latter: the facial arches, all of which, behind the mouth, carry gills, are here almost typical; they make a useful standard by which to measure those of other Vertebrates.

"But the Selachians are of great interest also because of the free development in them of *external gills*. I find four on each side both in *Scyllium* and in *Pristiurus*, and even the spiracular cleft, the first postoral opening.

"These acquire a considerable size; and I find in *Raia maculata four more* papillæ are added, which do not grow outwards, but add to the number of folds in the 'pseudobranchiæ' of the mandibular suspensorium.

"The numerous external branchiæ of the hyoid and proper branchial arches are seen to be an early 'crop' of papillæ that are clavate, and long; they only contain a single branchial loop.

"The permanent gill-folds arise in the same manner as the external gills, but they are later in appearance; they are a second crop springing among the roots of the first.

"The *first*, or external gills, are buddings from the skin on the edge of the facial bar, close behind the raised opercular fold; the second upgrowth of filaments lies a little within the first; and on those branchial arches that give gill-plates to the back of one space and to the front of the next these rudiments are arranged in a double row, and look like the cogs of a wheel. The foremost arch with permanent gill-folds is the hyoid; and this, like the last branchial arch, can have but *one* series of plaits.

"The mouth of a Selachian is much modified; the mandibular bar, before it is segmented into the suspensorium and free mandible (Meckel's cartilage), grows not *upwards* to the auditory region, but forwards to the back of the nasal sacs.

"Then a joint is formed, and a knob on the upper piece fits into a hollow on the lower; the upper piece is the quadrato-palatine arcade or upper jaw, and, like the lower jaw, is articulated to its fellow of the opposite side by ligamentous substance.

"There is a free cartilage above the quadrate in the Skate, the 'spiracular cartilage,' which is the proper, but detached, apex of the suspensorium. In the Lesser Spotted Dogfish there is nothing but a ligament ascending from the quadrate; but in some of the Sharks there is a small ray, in others two or even three of these rays, which are largely developed in the hyoid and branchial arches, forming the skeleton of the interbranchial folds.

"These folds are made still more strong in the Sharks by external cartilages that run outside each septum; these 'extrabranchials' are not developed in the Skates.

"In both groups there is a complex system of 'labial cartilages,' helping to form the 'rostrum,' and to supply valves for the nasal openings; in the Sharks the *lips* also have two or three pairs of these 'extravisceraIs.'

"The three pairs of sense-capsules have tracts of cartilage between them; and these may be called the 'intercapsular' bands generally: the *interauditory* are the parachordals, the *interocular* the 'trabeculæ,' and the *internasal* are the nasal septum and trabeculæ cranii. These latter grow into the face as a rudimentary visceral arch; it is composed of a pair of lateral processes and the azygous prenasal rostrum—the axis of the *cutwater*, so large in the Skate and Saw-fish.

"On each side of the nasal sac in Skates and some Sharks there is another pair of visceral arches, the ethmo-palatines. These are distinct cartilages; in some Sharks, as in *Scyllium canicula*, they exist as exogenous rudiments.

"As a rule there are five clefts or facial slits besides the spiracle; *Hexanchus* and *Heptanchus* have more, as their name implies.

"One or two more interesting facts may be mentioned: the notochord acquires a cartilaginous sheath of its own, and in young embryos it is *beaded* in front; the 'investing mass,' or interauditory cartilaginous bands, runs on undivided far into the vertebral region."

This paper will be printed entire in the Society's 'Transactions.'

Referring to Canon Tristram's recent "Note on the Discovery of the Roebuck (*Cervus capreolus*) in Palestine," Professor Newton observed:—

"I write to make a slight correction of a statement published in the last part of the Society's 'Proceedings' (P. Z. S. 1876, p. 421). The remains of the Roe-Deer obtained on Mount Carmel were sent to the Museum of the University of Cambridge by the late Mr. C. F. Tyrwhitt-Drake, and not by Dr. Conder (as might be inferred from the Canon's expression); while the species was determined by Mr. J. W. Clark and Sir Victor Brooke, not by me. The remains, I may add, consisted of a nearly perfect skeleton and a damaged skin of a buck."

The following papers were read:—

1. Description of a new Species of Indian Snake of the Genus *Platyplectrurus* from the Wynad. By Lieut.-Col. Beddome, C.M.Z.S.

[Received September 25, 1876.]

Platyplectrurus hewstoni, sp. nov.

Brownish black above, each scale with an elongated white blotch on each side towards its posterior portion; belly white, with here and there irregular brown blotches; scales in fifteen rows—abdominals 123 and bifid, subcaudals five pairs (female); tail smooth, laterally compressed, ending in a horny smooth scale with a single point; snout rounded, nasals forming a suture behind the rostral; supraorbital shield present; eye small, in a large shield, pupil round; no postocular; vertical six-sided; a large temporal shield between the occipitals and the fourth labial; no median groove.

Hab. Manantoddy, in the Wynad, elevation 2700 feet (discovered by Dr. Hewston).

2. A Monograph of the Group *Molossi*.

By G. E. Dobson, M.A., M.B., F.L.S., &c.

[Received October 20, 1876.]

The group *Molossi* was formed by me for the reception of three genera of Emballonuridæ—*Molossus*, *Nyctinomus*, and *Cheiromeles**, which agree together in the possession of certain well-marked natural characters which at the same time distinguish them from all other genera of this family. These genera, especially *Molossus* and *Nyctinomus*, or sections of them, have received several different names, each of which, without regard to priority, has met with favour from different zoologists, scarcely any two appearing to agree in adopting the same term; so that the same species is described not infrequently under three or four different generic titles in the works of almost contemporaneous observers. This has, no doubt, been due in a great measure to the original very imperfect definitions of these genera, and also to the want of any trustworthy arrangement of the large number of new species subsequently described.

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* I omit *Mormopterus*, Ptrs., formerly included by me (Ann. & Mag. Nat. Hist. ser. 4, vol. xvi. p. 349, 1875) in this group as a distinct genus, as I have lately discovered a species quite intermediate between the single representative of *Mormopterus* and the species of *Nyctinomus*. The group *Molossi* corresponds to Prof. Peters's family *Molossi* (Monatsb. Akad. Berl. 1865, p. 258).

The first satisfactory attempt to arrange the species scientifically in a systematic form, and to determine their correct synonymy, was made by Prof. Peters, who published, in 1865, in a footnote to his paper on the Brazilian species of Bats described by Spix*, a short list of the genera, subgenera, and typical species of this group, with descriptions of a few new species, and subsequently, in the same journal, gave the results of his examination of the typical specimens from which Geoffroy's and Wagner's original descriptions were taken. Finding, however, that not half the species of *Molossi* now known are included in Prof. Peters's list, in which also no descriptions are given, and that much remained to be done before any thing approaching a correct list of the species and their synonymy could be made out, I was induced to give the subject my special attention; and the following monograph of the species is the result of my examination of a large number of specimens (including most of the types) preserved in the British Museum, in the museums at Leyden, Berlin, and Paris, and in the Indian Museum, Calcutta, as well as in several smaller collections.

The *Molossi* may be defined as Bats of the family Emballonuridæ with short legs and well developed fibulæ, with broad strong feet (whereof the first toe or the first and fifth are much thicker than the others) furnished with long, curved, prehensile hairs; with a thick fleshy tail produced far beyond the posterior margin of the interfemoral membrane; with flat broad heads, and obtuse, obliquely truncated muzzles terminated by the projecting margins of the nostrils; with generally large and broad, often united ears, and a short, sometimes minute, tragus; with a single pair of well developed upper incisors converging inwards and forwards.

In all the species the upper lip is very thick, and often deeply furrowed by vertical wrinkles, evidence of its great expansibility. The wings are very narrow, and the middle finger very long, its metacarpal bone in most species slightly exceeding the total length of the last finger. The first phalanx of the middle finger is short, less than half the length of the metacarpal bone, on the dorsal surface of which it is folded forwards in repose. The interfemoral membrane sheathes the base of the tail, and is movable at the will of the animal backwards or forwards upon it, thus increasing or diminishing its surface.

The great length and narrowness of the wings indicate rapid flight; and the power possessed by these Bats of varying the extent of surface of the interfemoral membrane must confer upon them great dexterity in quickly changing the direction of their flight, as when obliged to double in pursuing their swiftly flying insect prey; while the extremely expansible lips evidently aid them especially in capturing during rapid flight and in maintaining their hold on the large round-bodied Coleoptera. Of all Bats the *Molossi* appear especially suited by their peculiar conformation for capturing the most rapidly flying insects, which, no doubt, form the greater portion of their food. Their large and very strong acutely tubercular teeth would enable them to crush with ease the hard armour of the larger Coleoptera.

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* Monatsb. Akad. Berlin, 1865, p. 573.

Synopsis of the Genera of Molossi.

a. First toe much larger and thicker than the other toes and separable from them; ears quite separate.
    a'. Premaxillary bones united; upper incisors very strong, close together in front .... 1. *Cheiromeles*, p. 704.
b. First and fifth toes much thicker than the other toes; ears united or close together by their inner margins.
    b'. Premaxillary bones united; upper incisors close together in front .... 2. *Molossus*, p. 705.
    c'. Premaxillary bones separate or united by cartilage only; upper incisors separate in front .... 3. *Nyctinomus*, p. 716.

The genus *Cheiromeles* is represented by a single species only, which, as I have previously remarked*, appears to be more closely allied to *Molossus*, which is restricted to America, than to *Nyctinomus*, of which several species inhabit the same countries with it.

The genera *Molossus* and *Nyctinomus* are very closely allied, some species, as *Molossus glaucinus*, Wagner, and *M. bonariensis*, Peters, forming the connecting links between them†. Nevertheless I retain these genera distinct, as they are convenient for grouping the species, and partly correspond to their geographical distribution, the species of *Molossus* being confined to America, while those of *Nyctinomus* are found in both hemispheres.

These genera have been divided into several subgenera, which depend on slight differences in dentition and in the form of the ear-conch and tragus. But so many perfectly intermediate forms exist that it is impossible to subdivide *Molossus* and *Nyctinomus*, which, indeed, as I have remarked above, may come to be regarded hereafter as subgenera only. Thus *M.* (*Promops*) *longimanus* resembles *M. rufus* (the representative of the subgenus *Molossus*) closely in the form of the tragus, and in the obtuse not obliquely truncated muzzle; and *M.* (*Promops*) *nasutus*, relegated to the subgenus *Promops* on account of its dentition, in all other respects is much more closely allied to *M. rufus*, with which it agrees in the peculiar form of the antitragus and tragus, and even in the distribution of the fur; while *M. rufus*, which differs from all other species in dentition, shows its close affinity to the representatives of the subgenus *Myopterus* in the perfectly similar form of its antitragus, and in the shape of its muzzle.

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* Monograph of the Asiatic Chiroptera, p. 177.

† Should the discovery of species even more intermediate than these render it necessary at any future time to unite the genera *Molossus* and *Nyctinomus*, the former name, which has priority, must be used for the single genus.

The subgenus *Mormopterus* is distinguished from *Nyctinomus* by the absence of the first minute upper premolars, and by the distinctly separate ears; but *N. norfolcensis*, Gray, is quite intermediate, agreeing with *Nyctinomus* in dentition, and in other respects with *Mormopterus*; and the discovery of *N. albiventer*, Dobson (described further on), adds another intermediate form[*].

Genus CHEIROMELES.

Cheiromeles, Horsfield, Zool. Researches in Java, 1824; Temminck, Monogr. Mamm. ii. p. 345; Dobson, Monogr. Asiatic Chiroptera, p. 177, 1876.

Ears separate, as in *Taphozous*; extremity of the muzzle projecting considerably beyond the lower jaw; lips smooth, not grooved by vertical wrinkles; first toe much larger than the others, and separable from them.

Dentition.—Inc. $\frac{2}{2}$, C. $\frac{1-1}{1-1}$, Pm. $\frac{1-1}{2-2}$, M. $\frac{3-3}{3-3}$.

Premaxillary bones well developed, conjoined, supporting two strong incisors.

CHEIROMELES TORQUATUS.

Cheiromeles torquatus, Horsfield, *l. c.*

Dysopes cheiropus, Temm. *l. c.* i. p. 218, pl. 17.

Cheiromeles caudatus, Temm. *l. c.* ii. p. 348, pl. 66.

Ears shorter than the head, triangular, with narrowly rounded tips; the inner margin of the ear-conch papillate along upper half as in some species of *Taphozous*; antitragus distinct, rounded; tragus very small, the inner margin not developed, the outer with a small projection near the base. Muzzle long, obliqnely truncated, the extremity projecting very considerably beyond the lower jaw. An enormous gular sac extends half round the neck beneath. Into this sac the oily secretion of glands situated between the internal origins of the pectoral muscles is discharged, in males by a series of small pores collected in two circular slightly elevated patches, in females by a single large orifice.

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[*] The following is a synopsis of the characters of these subgenera:—

Synopsis of Subgenera of Molossi.

Gen. MOLOSSUS.
  a. Ears more or less united.
    a′. Premolars $\frac{2-2}{2-2}$; upper incisors with diverging summits, and with their broad bases close to the canines .... *Promops*, Gervais.
    b′. Premolars $\frac{1-1}{2-2}$; upper incisors parallel by their inner margins, their bases close to the canines .... *Molossus* (Geoffr.), Peters.
  b. Ears distinctly separate; upper incisors with diverging summits, their bases removed from the canines by a diastema .... *Myopterus*, Geoffr.

Gen. NYCTINOMUS.
  a. Ears very close or united together; upper lip deeply grooved by vertical wrinkles; premolars $\frac{2-2}{2-2}$ .... *Nyctinomus* (Geoffr.), Peters.
  b. Ears distinctly separate; upper lip slightly wrinkled; premolars $\frac{1-1}{2-2}$ .... *Mormopterus*, Peters.

First toe very thick, thinly covered with long curved hairs on the outer side; this toe is separated from the others like a thumb, and is probably opposable to them. Wing-membrane from the middle of the tibia, and from the sides of the back near the spine. A deep axillary pouch is formed, in both male and female, by an extension of a fold of skin, derived from the thick integument covering the breast and sides of the body, to the inferior surface of the humerus, and, longitudinally, to the femur. In the anterior part of this pouch, on the side of the body, behind the axilla, the mamma is placed.

Tail very thick and long, projecting more than half its length beyond the short interfemoral membrane.

Integument very thick and almost quite naked, with strong plications along lines of flexure and extension; the back is quite naked; but a collar of very short thinly spread hairs nearly surrounds the neck.

Upper incisors strong, placed close together, their extremities converging inwards; the single upper premolar large and tricuspidate; first lower premolar minute, wedged in in the space between the canine and second premolar, which are close together; the last upper molar less than half the size of the second molar.

Length: head and body 5″·3; tail 2″·6; head 1″·8; ear 1″·2, tragus 0″·15; forearm 3″·1; thumb 0″·8; second finger 7″; third finger 5″·6; fourth finger 3″·1; tibia 1″·4; foot and claws 1″·05.

Hab. Malay peninsula (Pinang, Singapore), Sumatra, Java, Borneo.

Genus MOLOSSUS.

Molossus, Geoffroy, Annal. du Mus. vi. (1805), p. 154; Peters, Monatsb. Akad. Berl. 1865, p. 574.

Dysopes, Illiger, Prodr. Syst. Mammal. (1811), p. 122.

Ears close together, or united at the bases of their inner margins; tragus very short, sometimes minute; extremity of the muzzle broad, obtuse, or very obliquely truncated; lips smooth or with very indistinct vertical wrinkles; first and fifth toes much thicker than the others, the backs of all the toes with long curved hairs.

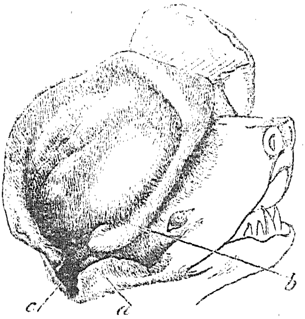
Dentition.—Inc. $\frac{2}{2}$ or $\frac{2}{4}$, C. $\frac{1-1}{1-1}$, Pm. $\frac{1-1}{2-2}$ or $\frac{2-2}{2-2}$, M. $\frac{3-3}{3-3}$.

Premaxillary bones well developed, united; upper incisors strong, their inner margins close together in front; first minute upper premolar generally external to the tooth-row or absent; first lower premolar half the size of the second, standing in the tooth-row (except in *M. rufus*, where it is partly internal and concealed by the closely approximated second premolar).

Range.—Tropical and subtropical regions of America.

In the following analytical table of the species, and in the subsequent descriptions, reference is often made to the different parts of the ear-conch shown and named in the woodcut below, which represents, in half-outline, the head of *Molossus glaucinus*.

Fig. 1.



Head of *M. glaucinus*.

a, Antitragus; *b*, keel of the ear-conch; *c*, notch behind antitragus.

Synopsis of the Species.

- I. Muzzle obtuse, rounded in front; lips smooth, not wrinkled; tragus triangular or linear.
  - *a*. Antitragus circular, as high as long.
    - *a'*. Tragus triangular with a broad base; inner margins of the ears arising by separate points of origin; inc. $\frac{2}{4}$, pm. $\frac{1-1}{2-2}$.
      - *a''*. Ears obtusely pointed, forearm 1″·2........ 1. *M. temminckii*, p. 707.
      - *b''*. Ears rounded above.
        - *a'''*. Centre of breast and abdomen white; forearm 1″·35............................ 2. *M. planirostris*, p. 707.
        - *b'''*. Centre of breast and abdomen not different from sides; forearm 1″·7 ...... 3. *M. brachymeles*, p. 708.
    - *b'*. Tragus linear, subacutely pointed, inner margins of the ears arising from the same point or very close together.
      - *c''*. Inc. $\frac{2}{2}$, pm. $\frac{1-1}{2-2}$ ... . 4. *M. rufus*, p. 709.
      - *d''*. Inc. $\frac{2}{4}$, pm. $\frac{2-2}{2-2}$ .... 5. *M. nasutus*, p. 711.
  - *b*. Antitragus half-oval or half-cordate, longer than high, tragus linear; inc. $\frac{2}{4}$, pm. $\frac{2-2}{2-2}$ .... 6. *M. abrasus*, p. 712.
- II. Muzzle very obliquely truncate, its superior and external front margins formed by the sharply cut cartilaginous rim of the nostrils, lips smooth or very slightly wrinkled; tragus quadrate; inc. $\frac{2}{4}$, pm. $\frac{2-2}{2-2}$.
  - *a*. Ears longer than the head; gular sac large; first upper premolar external .... 7. *M. perotis*, p. 713.
  - *b*. Ears shorter than the head, gular sac small; first upper premolar in the tooth-row.
    - *a'*. Upper lip smooth; forearm 2″·3 .... 8. *M. glaucinus*, p. 714.
    - *b'*. Upper lip slightly wrinkled; forearm 1″·8 ... 9. *M. bonariensis*, p. 715.

Inc. $\frac{2}{4}$; *Pm.* $\frac{1-1}{2-2}$; *ears separate; tragus triangular.*

(Subgen. Myopterus, Geoffr.)[*]

1. MOLOSSUS TEMMINCKII.

Dysopes temminckii, Lund, Burmeister, Thiere Brasiliens, p. 72 (1854).

Molossus (*Molossops*) *temminckii*, Peters, Mon. Akad. Berl. 1865, p. 575.

Ears rather small, pointed, their inner margins arising from the forehead by separate points of origin: antitragus circular; tragus short and obtuse, with a broad base. Extremity of the nose slightly prominent, broad, and flat, with an obtuse projection between the nasal orifices, but without arched ridges above them. Lips smooth, with a few straight hairs.

Fur, above, reddish-brown at the extremities, the base of the hairs yellowish-white; beneath, similar, but paler. Integument and membranes dark throughout.

Calcanea very long, reaching almost to the tail.

Length: head and body 1″·5; tail 1″·0, tail free from membrane 0″·5; forearm 1·″2; calcaneum 0″·65.

Hab. Brazil (Lagoa Santa).

The above description has been taken from the original description by Burmeister, as I have not seen the type.

2. MOLOSSUS PLANIROSTRIS.

Molossus (*Molossops*) *planirostris*, Peters, Mon. Akad. Berl. 1865, p. 575.

Ears much shorter than the head, their inner margins arising from the sides of the superior surface of the face above and in front of the eyes, their points of origin widely separate; upper three fourths of inner and outer margin regularly convex, forming almost an arc of a circle; keel of the ear-conch very slightly developed; tragus short, triangular, with a broad base, acutely pointed, inner margin straight; antitragus large and round, very similar in shape and size to that of *M. obscurus* (p. 710), but its base is somewhat broader. Muzzle flat, smooth and naked above, extremity obtuse, not obliquely truncated; the margins of the nasal apertures not prominent, placed high above the margin of the upper lip; lips smooth, not wrinkled. A distinct, but not large, gular sac in ♂, rudimentary or absent in ♀. Wings from the distal third of the tibiæ.

Fur very short; above, dark-brown, the bases of the hairs white; beneath, along the sides of the body, brown; the chin, neck, and a broad longitudinal band on the chest and abdomen yellowish-white. The fur of the body extends upon the wing-membrane, above and beneath, nearly as far outwards as a line drawn from the middle of the humerus to the middle of the femur, the remainder of the membrane nearly naked; a few fine hairs appear behind the distal half of the forearm on the upper surface, and clothe the proximal third of the fifth metacarpal bone; beneath, the wings are quite naked, except along the sides of the body.

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[*] These subgenera are indicated here, and at different places further on, for convenience only, in order to avoid repeating the dental formula when describing each species, not for the purpose of pointing out natural subdivisions of the genera.

Upper incisors long, the centres of their inner sides close together, their bases and summits separated; lower middle incisors slender, with grooved crowns; outer incisors very small, between the middle incisors and the canines, and not grooved. First upper premolar large, close to the canine, with a large anterior and internal basal cusp, and a smaller cusp posterior and external. Lower canine on each side with a small internal basal cusp, which nearly touches its fellow of the opposite side.

Length (of an adult ♂): head and body 2″·3; tail 1″·2; tail free from membrane 0″·4; head 0″·85; ear 0″·6, tragus 0″·15 × 0″·1; forearm 1″·85; thumb 0″·25; second finger—metacarp. 1″·35, 1st ph. 0″·6, 2nd ph. 0″·65; third finger—metacarp. 1″·25, 1st ph. 0″·5, 2nd ph. 0″·2; fourth finger—metacarp. 0″·85, 1st ph. 0″·4, 2nd ph. 0″·15; tibia 0″·4; foot and claws 0″·3.

Hab. Brazil (Buenos Ayres, Barra do Rio Negro); British Guiana (Berbice).

The next species is probably identical with *Myopterus daubentonii*, Geoffroy (Descr. de l'Egypte, ii. p. 113), with which it agrees very closely in the length of its skull, the only remnant of the type of that species, which therefore cannot be accurately determined. Of this skull Prof. Peters (MB. Akad. Berl. 1869, p. 402) has given the following measurements:—"length 0″·85; width across zygomatic arches 0″·5; length of upper tooth-row (not including incisors) 0″·32; length of lower tooth-row 0″·35."

3. MOLOSSUS BRACHYMELES.

Molossus (*Molossops*) *brachymeles*, Peters, Monatsb. Akad. Berlin, 1865, p. 575.

Appears to differ from the preceding species only in being conspicuously larger, in the different colouring of the fur of the under surface, and in its slightly different distribution.

Fur above dark brown, the base of the hairs paler; beneath reddish brown. The antebrachial membrane is covered with a small patch of fur along the forearm, and the wing-membrane between the metacarpal bones of the last two fingers and the forearm. Beneath, the fur of the body extends upon the wing-membrane along the sides of the body only; the remaining parts are quite naked.

Total length 4″·0; head 0″·9; ear 0″·6; forearm 1″·7; middle finger 3″·4; tibia 0″·5; foot 0″·46.

Hab. Peru.

The above is taken from Prof. Peters's description of the only specimen known, a stuffed skin, preserved in the Neuchâtel Museum.

Inc. $\frac{2}{2}$; *pm.* $\frac{1-1}{2-2}$; *ears close together, tragus linear.*

(Subgen. MOLOSSUS, Ptrs.)

4. MOLOSSUS RUFUS.

Molossus rufus, Geoffroy, Ann. du Mus. vi. (1805), p. 154; Gervais, Expéd. de Castelnau, Zoologie, p. 58, pl. xii. figs. 4 and 4 *a* (skull and teeth); Peters, Monatsb. Akad. Berl. 1865, p. 575.

Molossus ursinus, Spix, Sim. et Vespert. Brasil. (1823), p. 58, pl. xxv. fig. iv.

Dysopes alecto, Temminck, Monogr. Mammal. i. p. 231 (1835–41).

Dysopes holosericeus et *albus*, Natt., Wagner, Wiegm. Archiv, 1843, p. 368. (*Vide* Peters, Mon. Akad. Berl. 1866, p. 22.)

Dysopes ursinus, Wagner, Suppl. Schreb. Säugeth. v. p. 709 (1855).

Ears much shorter than the head, their inner margins arising close together, slightly in front of a line drawn between the eyes, from a point on the forehead, from which a sharp ridge passes forwards on the face to the nose: outer and inner margins of the ear-conch convex, forming almost a regular semicircle; antitragus circular, arising by a narrow base from which it expands equally anteriorly and posteriorly; tragus minute, linear, acutely pointed. Extremity of the muzzle obtuse, rounded, projecting beyond the mandible; the nasal apertures directed forwards and slightly outwards, separated by a considerable interval (which is covered with short erect hairs dilated at their extremities) from the margin of the lip, beyond which the extremity of the nose scarcely projects; lips thick, smooth, without wrinkles.

In the male, the opening of a large glandular sac directed forwards is found opposite the anterior extremity of the sternum; in the female this sac is much smaller.

Wings from the ankles. Fur very short, deep reddish brown above and beneath. The face and ears are nearly naked. On the upper surface, the wing-membrane is covered as far as a line drawn from the middle of the humerus to the middle of the femur, and short fur extends upon half the antebrachial membrane, and behind the distal two-thirds of the forearm to the carpus, covering also the angle between the fourth and fifth metacarpal bones; behind, the base of the interfemoral membrane also is covered. Beneath, the fur of the body extends upon the wing-membrane almost as far outwards as a line drawn from the elbow to the knee; and a band passes outwards behind the elbow, becoming gradually wider towards the carpus, till it occupies a space there extending from the forearm to the middle of the metacarpal bone of the fourth finger, beyond which it passes and occupies the angle between it and the metacarpal of the third finger, being limited in its extent outwards by the muscular band extending to the wing-membrane in this position; a small space between the proximal extremity of the fifth metacarpal and the short muscular band extending from the end of the forearm to the wing-membrane is naked.

Upper incisors moderately long and acutely pointed, converging inwards and forwards, their bases touching the canines, their inner sides approximated; at the outer side of the base of each tooth, a small blunt projection from the cingulum which touches the canines; the single upper premolar large, and close to the canine; lower incisors two, bifid, in front of the closely approximated canines which have each a broad internal basal cusp; first lower premolar scarcely half the size of the second, which lies so close to it as to be with difficulty distinguished in recent specimens as a separate tooth, its outer and posterior side is partially covered by the obliquely directed cingulum of the second premolar; last upper molar narrow, less than half the size of the antepenultimate molar.

Length (of an adult male): head and body 3″·5; tail 2″·0; head 1″·2; ear 0″·65, tragus 0″·1; forearm 2″·1; thumb 0″·4; second finger—metacarp. 2″·0, 1st ph. 1″·05, 2nd ph. 1″·15; third finger—metacarp. 1″·95, 1st ph. 0″·9, 2nd ph. 0″·2; fourth finger—metacarp. 1″·3, 1st ph. 0″·55, 2nd ph. 0″·25; tibia 0″·7; foot and claws 0″·5.

Hab. Mainland of Tropical America (Rio de Janeiro, Pernambuco, Para, Rio Negro, Dutch Guiana, Oaxaca).

Subspecies *a*. MOLOSSUS OBSCURUS.

Molossus obscurus, Geoffroy, Annal. du Mus. vi. (1805), p. 154; Gervais, *l. c.* fig. 5 (skull).

Molossus longicaudatus, Geoffroy, *l. c.*

Molossus acuticaudatus, Geoffroy (*vide* Peters, Mon. Akad. Berlin, 1869, p. 402).

Dysopes velox, Natt. Temminck, Monogr. Mammal. i. p. 234 (1836); Wagner, Suppl. Schreb. Säugeth. i. p. 476 (1844), v. p. 712 (1855); Burmeister, Thiere Brasiliens, Th. i. p. 71 (1854).

Molossus velox, Gray, Mag. Zool. Bot. ii. (1838), p. 501.

Molossus fuliginosus, Gray, *l. c.*

Molossus tropidorhynchus, Gray, Ann. Nat. Hist. 1839, p. 5.

Dysopes olivaceo-fuscus, Natt. Wagner, Abh. Münch. Akad. v. p. 202 (1844). (*Vide* Peters, *l. c.* 1866, p. 22.)

Dysopes fumarius, Burmeister, *l. c.* p. 71.

Molossus fumarius, Tomes (non Spix), P. Z. S. 1861, p. 68.

Quite similar to *M. rufus* in structure, but much smaller, the forearm constantly measuring 1″·7 or less, as compared with 2″·1.

The fur covering the wing-membrane between the humerus and forearm extends somewhat further outwards; and the upper incisors are closer together.

It will probably be found hereafter, when a sufficiently large number of specimens are available for examination, that the above-named differences are unimportant, and that the only real difference consists in size.

Length (of an adult ♂): head and body 2″·7; tail 1″·6; head 0″·85; ear 0″·55, tragus 0″·08; forearm 1″·65; thumb 0″·3; second finger—metacarp. 1″·6, 1st ph. 0″·75, 2nd ph. 0″·6; third finger—metacarp. 1·55, 1st ph. 0″·65, 2nd ph. 0″·15; fourth finger

—metacarp. 0″·95, 1st ph. 0″·48, 2nd ph. 0″·2; tibia 0″·55; foot and claws 0″·4.

Hab. Tropical America and its islands; apparently generally distributed. Found in Peru at an elevation of 9000 feet.

Inc. $\frac{2}{4}$; *pm.* $\frac{2-2}{2-2}$; *ears close together or united; tragus subacute or quadrate.* (Subgen. PROMOPS, Gervais.)

5. MOLOSSUS NASUTUS.

Molossus nasutus, Spix, Simiar. et Vespert. Brasil. p. 58, pl. xxxv. fig. vii. (1823); Peters, Mon. Akad. Berl. 1865, p. 578, pl. fig. 4 (skull).

Molossus fumarius, Spix, *l. c.* figs. v. and vi.

Promops ursinus, Gervais (non Spix), Expéd. de Castelnau, Zoologie, p. 59, pl. xii. figs. 3, 3*a* (dentition) (1855).

Ears much shorter than the head; laid forwards, the inner margin of the conch extends slightly further than halfway between the eye and end of the muzzle; inner margins less than one tenth of an inch apart at their bases, uniting on the muzzle in a prominent rounded ridge which ends abruptly at a short distance behind and above the nostrils; inner and outer margins of the ear-conch continuous, forming almost an an arc of a circle; ear-keel short, thickened, but not expanded beneath, clothed posteriorly with short hairs; antitragus circular with a narrow base, as in *M. rufus*, but thickened and expanded above and posteriorly, so that its very convex superior and posterior margin projects backwards considerably beyond its base; tragus very small, as in *M. rufus*, with a minute projection at the outer side of its base. Muzzle very obtuse in front, nearly vertically truncated; nostrils directed forwards and slightly outwards, connected above by an ill-defined ridge which does not extend downwards between them, the wide space between the nostrils and the margin of the upper lip occupied by a quadrilateral patch of thickly spread short hairs, the sides of the muzzle almost naked. A large gular sac in ♂, as in *M. rufus*.

Wings from the ankles; interfemoral membrane deep, including quite three fourths of the tail.

Fur moderately long, but conspicuously longer than in *M. rufus*, dark brown above, paler beneath, the base of the hairs whitish on both surfaces. On the upper surface, a band of short fur commences in a narrow line at the beginning of the middle third of the forearm, increases in width outwards so as to cover the proximal third of the fifth metacarpal bone and fourth of the fourth metacarpal, occupying also the portion of wing-membrane between; beneath, the wing-membrane between the humerus and femur is thickly covered, and a band of fur, 0″·3 wide, extends outwards behind the forearm to the fifth metacarpal bone and to the wing-membrane beyond it, covering half the bone.

First upper premolar very small, quite external to the tooth-row.

Length (of an adult ♂ preserved in alcohol): head and body 3″·1; tail 2″·1, tail free from membrane 0″·7; head 0″·9; ear 0″·6, tragus 0″·08 × 0″·02; forearm 2″·0; thumb 0″·3; second finger —metacarp. 2″·05, 1st ph. 0″·95, 2nd ph. 0″·95; third finger—metacarp. 2″·0, 1st ph. 0″75, 2nd ph. 0″·15; fourth finger—metacarp. 1″·2, 1st ph. 0″·5, 2nd ph. 0″·22; tibia 0″·7; foot and claws 0″·4.

Hab. Brazil; Central America (Guatemala).

The above description has been taken from an adult male specimen obtained by Mr. Salvin in Guatemala, and preserved in alcohol in the collection of the British Museum. The only other specimens known are imperfectly preserved skins, the types of *M. nasutus*, and *M. fumarius*, Spix, of which the first intelligible description was published by Dr. Peters.

This species is quite intermediate between *M. rufus* (Subg. *Molossus*) and *M. abrasus* (Subg. *Promops*), agreeing with the former in the form of the ear, and even in the distribution of the fur, with the latter in the form and number of the teeth.

6. MOLOSSUS ABRÁSUS.

?*Molossus ater*, Geoffroy, Annal. du Mus. vi. (1805) p. 153.

Dysopes abrasus, Temminck, Monogr. Mammal. i. p. 232, ii. p. 356 (1835–41); Wagner, Suppl. Schreb. Säugeth. i. p. 475 (1844), v. p. 710 (1855).

Dysopes longimanus, Wagner, Wiegm. Archiv, 1843, p. 367; Suppl. Schreb. Säugeth. 1855, p. 709.

Dysopes leucopleura, Wagner, *l. c.*; Burmeister, Thiere Brasiliens, p. 73 (1854).

Molossus abrasus, Peters, Mon. Akad. Berlin, 1865, p. 574.

Ears much shorter than the head, but conspicuously larger than in *M. rufus*, united by their bases only on the muzzle at a point equally distant from the anterior commissure of the eyelids and the nostrils; outer and inner margins of the ear regularly convex, forming together almost a perfect arc of a circle; antitragus half-cordate, with a broad base, separated behind by a deep notch; keel of the ear-conch well-developed, thickened and expanded externally in lower half; tragus minute, linear, subacutely pointed, slightly larger than in *M. rufus*, but with a broad base.

Muzzle obtuse, nasal apertures directed forwards and slightly outwards, the end of the nose scarcely projecting beyond the margin of the upper lip, which is separated from the margin of the nostrils by a space less wide than in *M. rufus*; the external margins of the nostrils more prominent than in that species, and continued upwards and inwards above the nasal apertures, and downwards between them in a conjoined ridge to the margin of the lip; the upper margin of the nasal disk thus formed on each side is finely and evenly toothed, and the internasal ridge covered with short spoon-shaped hairs, similar to those forming a broad patch between the nostrils and upper lip in *M. rufus*, but strictly limited to this ridge; the margin of the upper lip in front is fringed with straight hairs.

Wings from the ankles, or from the tibiæ slightly higher up. Gular sac distinct in ♂, rudimentary in ♀.

Fur short, and intensely black above and beneath. The muzzle in front of the ears is nearly naked, also the inferior surface of the lower jaw. The fur of the body extends upon the wing-membrane above almost as far as a line drawn from the middle of the humerus to the knee-joint; beneath, as far as a line drawn from the middle of the humerus to the middle of the femur; a small patch of fur appears on the upper surface of the antebrachial membrane near the forearm; and the base of the interfemoral is covered; but the remainder of the membranes are naked.

Upper incisors close together, parallel; lower incisors very small, bifid, the outer incisor on each side concealed between the middle incisor and the base of the canine; inner basal cusps of the lower canines almost touching behind the incisors as in *M. rufus*. First upper premolar very small, scarcely raised above the gum, and scarcely visible without aid of a lens, in the small space between the canine and second premolar, but close to the outer margin of that space; in another specimen, this small premolar is larger, and outside the tooth-row, though a narrow space still intervenes between the canine and the second premolar.

Length (of an adult ♀): head and body 3″·25; tail 1″·8, tail free from membrane 0″·9; head 1″·15; ear 0″·8, tragus 0″·12; forearm 2″·45; thumb 0″·45; second finger—metacarp. 2″·4; 1st ph. 1″·1, 2nd ph. 1″·3; third finger—metacarp. 2″·3, 1st ph. 0″·9, 2nd ph. 0″·4; fourth finger—metacarp. 1″·2, 1st ph. 0″·8, 2nd ph. 0″·35; tibia 0″·7; foot and claws 0″·4.

Hab. Brazil (Mato Grosso, Barra do Rio Negro); Surinam; Peru.

Prof. Peters has very kindly sent me a specimen of this species which he had determined by direct comparison with the type in the Leyden Museum. The absence of a gular sac, mentioned by Temminck, is due to the immature condition of the specimen from which the original description was taken.

7. MOLOSSUS PEROTIS.

Dysopes perotis, Wied, Beitr. Naturg. Brasil. ii. (1825), p. 227; Wagner, Suppl. Schreb. Säugeth. i. p. 473, v. p. 708; Burmeister, Thiere Brasiliens, p. 68 (1854).

Dysopes rufus, Temm. (non Geoffr.), Monogr. Mammal. i. p. 230 (1835–41).

Dysopes (Molossus) gigas, Peters, Mon. Akad. Berl. 1864, p. 381.

Molossus (Promops) perotis, Peters, *l. c.* 1865, p. 574.

Ears very large, united in front; laid forwards, they extend beyond the extremity of the nose; the outer and inner margins of the ear-conch regularly circular; antitragus much longer than high, convex, separated posteriorly by an angular notch, tragus quadrate with rounded angles, no prominent lobule at the base of the outer margin; keel of the ear-conch well developed, thickened and flattened externally. Muzzle very obliquely truncated, the extremity of the nose projecting much beyond the retracted upper lip, which is also concealed by a fringe of short hairs; nasal apertures directed forwards and downwards; the cartilaginous sharply cut edges of the nostrils projecting laterally and above, terminating the muzzle in front; sides of the face behind the eyes, in front of the ears much flattened, in front of the eyes prominent, convex, concealing the eyes when viewed anteriorly; lips smooth, without vertical wrinkles, sides of the lips very thick, the outer edge exceeding the inner in length, fringed with short fine hairs.

Gular sac large in male, rudimentary in female.

Wings from the lower end of the tibia.

Fur, above, reddish-brown; paler, almost buff, at the base of the hairs; beneath, much paler.

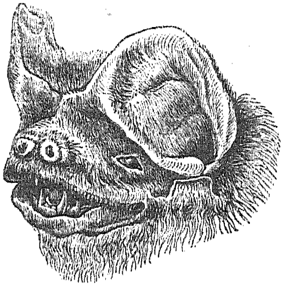
On the upper surface the wing-membrane is covered as far as a line drawn from the middle of the humerus to the knee; and a band of fur extends from the commencement of the middle third of the forearm along its posterior margin to the metacarpal bone of the fourth finger, covering one third of its length, and passing across it to the angle between it and the metacarpal of the third finger; beneath, the wing-membrane external to the humerus is naked.

First upper premolar minute, in the outer angle between the canine and second premolar, lower incisors crowded, bifid.

Length, head and body (about) 5″·0; tail 2″·8; ear 1″·5, tragus 0″·2 × 0″·1; forearm 2″·9; thumb 0″·45; second finger—metacarp. 3″·0, 1st ph. 1″·35, 2nd ph. 1″·6; third finger—metacarp. 2″·9, 1st ph. 1″·15, 2nd ph. 0″·25; fourth finger—metacarp. 1″·65, 1st ph. 0″·9, 2nd ph. 0″·35; foot and claws 0″·65.

Hab. Brazil (Lagoa Santa; Parahyba; Barra do Rio Negro); Bolivia.

Fig. 2.



Head of *M. glaucinus.*

8. Molossus glaucinus.

Dysopes glaucinus, Natt., Wagner, Wiegm. Archiv. 1843, p. 368; Suppl. Schreb. Säugeth. v. p. 710 (1855); Burmeister, Thiere Brasiliens, p. 73 (1854); Peters, Mon. Akad. Berl. 1866, p. 22.

Molossus ferox, Gundlach, Mon. Akad. Berl. 1861, p. 149; Peters, *l. c.* 1865, p. 574.

In the form of the muzzle and ears very similar to the preceding species; but the ears are comparatively much smaller; laid forwards, the inner margin of the ear-conch reaches to within one tenth of an inch from the extremity of the muzzle; inner margins of the ears united by their bases on the muzzle at a point nearer to the extremity of the nose than to the anterior commissure of the eyelids; outer and inner margins of the conch regularly convex; antitragus separated by a deep and narrow emargination, commencing anteriorly in a plane slightly above the angle of the mouth, tragus small, quadrate, superior margin straight, outer and inner margins concave, no projecting lobule at the base of the outer margin; keel of the ear-conch as in *M. perotis*, terminating posteriorly and inferiorly in a deep, thick, flattened ridge, which is in the same perpendicular line with, and almost touches the antitragus.

A smaller gular sac in ♂, rudimentary in ♀, opening directed downwards and slightly forwards.

Wings from the ankles; distribution of fur upon the wing-membranes as in *M. perotis*; above, light brown at the base of the hairs, then chestnut-brown, the extreme tips greyish, so that the upper surface appears altogether grey; beneath similarly coloured but much paler.

Upper and lower incisors as in *M. perotis*; the first upper premolar scarcely elevated above the gum, in the centre of the space between the canine and second premolar.

Length (of an adult ♀): head and body 3″·1; tail 2″·15, tail free from membrane 1″·0; head 1″·2; ear 0″·9, tragus 0″·12; forearm 2″·35; thumb 0″·35; second finger—metacarp. 2″·35, 1st ph. 1″·0, 2nd ph. 1″·2; third finger—metacarp. 2″·25, 1st ph. 0″·85, 2nd ph. 0″·3; fourth finger—metacarp. 1″·2, 1st ph. 0″·75, 2nd ph. 0″35; tibia.0″·8; foot and claws 0″·5.

Hab. Brazil (Mato Grosso); Surinam; Jamaica; Cuba.

9. Molossus bonariensis.

Promops bonariensis, Peters, Mon. Akad. Berl. 1874, p. 232 (cum fig., pl.).

Ears united by a deeper band than in *M. glaucinus*; ear-conch as broad as high; antitragus broader than high, convex; tragus quadrate, as in the preceding species. Muzzle obliquely truncated, extremity of the nose almost double as broad as the base of the antitragus; upper lip with a few shallow vertical wrinkles.

Wing-membrane from the ankles.

Fur rather short, somewhat shorter above than beneath. Beneath, the wing-membrane is covered as far as a line drawn from the middle of the humerus to the knee; a few short hairs extend along the posterior margin of the forearm. Above, the outer half of the antebranchial membrane is covered with short woolly hairs; and a band of similar hairs passes outwards behind the forearm, becoming gradually so broad as to cover almost half the metacarpal bone of the last finger. Above, reddish brown, the base of the hairs whitish; paler beneath, the extremities of the hairs brownish white.

The skull agrees in size with that of *M. nasutus*, Spix; but the facial portion is much longer, and the brain-case wider than in that species. Upper incisor on each side with a short outer basal cusp, and separated from the canine by a slight interval; first upper small premolar in the space between the canine and second premolar.

Length: head and body 3″·0; tail 1″·4, tail free from membrane 0″·65; head 1″·0; ear 0″·6, tragus 0″·12; forearm 1″8; thumb 0″·34; second finger—metacarp, 1″·8, 1st ph. 0″·7, 2nd ph. 0″·65; third finger—metacarp. 1″·7, 1st ph. 0″·6, 2nd ph. 0″·2; fourth finger—metacarp. 0″·65, 1st ph. 0″·55, 2nd ph. 0″·15; tibia 0″·55; foot and claws 0″·44.

Hab. Buenos Ayres.

I have not seen the single specimen as yet obtained of this recently described species. I have therefore been obliged to copy Prof. Peters's original description, which is accompanied by an excellent plate.

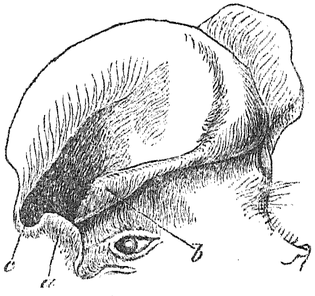
Genus NYCTINOMUS.

Nyctinomus, Geoffroy, Descript. de l'Egypte, ii. p. 114 (1812); Horsfield, Zool. Researches in Java; Gray, Mag. Zool. Bot. ii. (1838), p. 500; Peters, Mon. Akad. Berl. 1865, p. 573.

Dinops, Savi, Nuov. Giorn. de' Lett. p. 230 (1825); Bullet. des Scien. Nat. viii. p. 286 (1826).

Dysopes, Cretzschmar (non Illiger), Rüppell, Atlas Reise nördl. Afrika, Zoolog. (1826), p. 69; Temminck (in part), Monogr. Mammal. i. p. 226 (1835–41).

Fig. 3.



Head of *Nyctinomus macrotis*.

a. Antitragus; *b.* Keel of the ear-conch; *c.* Notch behind antitragus.

Ears united on the muzzle, or close together by the bases of their inner margins; tragus short, quadrate, or rounded off above, never linear; extremity of the muzzle broad, very obliquely truncated, projecting considerably beyond the lower lip, terminated by the sharply cut margin of the nostrils; upper lip very expansible, generally deeply grooved with vertical wrinkles; wings and feet as in *Molossus*.

Dentition.—Inc. $\frac{2}{6}$ or $\frac{2}{4}$, C. $\frac{1-1}{1-1}$, Pm. $\frac{2-2}{2-2}$ or $\frac{1-1}{2-2}$, M. $\frac{3-3}{3-3}$.

Premaxillary bones separate in front or conjoined by cartilage only, upper incisors close to the canines by their bases, separate in front, their cusps converging inwards and forwards.

Range.—Generally distributed throughout the tropical and warmer parts of the temperate zones of both hemispheres.

In the following analytical table of the species, and in the subsequent descriptions, reference is often made to the different parts of the ear-conch which are shown and named in the drawing (see p. 716), which represents, in half-shading, the head of *Nyctinomus macrotis*, Gray.

Synopsis of the Species.

I. Premolars $\frac{2-2}{2-2}$.
- *a.* Integument of the ears thick, opaque; keel of the ear-conch thickened in lower third; antitragus separated by a deep notch.
  - *a'* Lips smooth; inner margins of the ears arising from the muzzle by distinct points of origin; tragus broad, rounded off above.
    - *α.* Antitragus irregularly quadrate; lower incisors 4 .... 1. *N. africanus*, p. 719.
  - *b'* Lips furrowed by deep vertical wrinkles.
    - *a''*. Ears separate or conjoined at the bases of their inner margins only; tragus broad, rounded off above.
      - *a'''*. Ears conjoined at the bases of their inner margins; gular sac distinct in ♂.
        - *β.* Antitragus obliquely triangular, rounded; lower incisors 6 ...... 2. *N. cestoni*, p. 719.
      - *b'''*. Ears separate; no gular sac.
        - *γ.* Antitragus half oval.
          - *α'*. Lower incisors 4 .... 3. *N. ægyptiacus*, p. 721.
          - *β'*. Lower incisors 6 .... 4. *N. tragatus*, p. 721.
    - *b''*. Ears conjoined by a more or less deep band; tragus small; no gular sac.
      - *c'''*. Ears conjoined at the bases of their inner margins.
        - *α.* Fur unicoloured; wings from the lower end of the tibiæ .... 5. *N. plicatus*, p. 721.
        - *β.* Fur greyish on the surface; wings from the middle of the tibiæ ... 6. *N. bivittatus*, p. 722.
      - *d'''*. Ears conjoined by a deep band in front.
        - *α.* The first upper premolar stands in the tooth-row.
          - *α'*. Lower third of the ear-keel much thickened and flattened externally.. .... 7. *N. brachypterus*, p. 722.
          - *β'*. Lower third of the ear-keel slightly thickened, not flattened externally.
            - *α''*. Fur of the chest and abdomen uniform in colour .... 8. *N. pumilus*, p. 723.
            - *β''*. Fur of the lower half of the chest and the abdomen white.............. 9. *N. limbatus*, p. 724.

- β. The first upper premolar external to the tooth-row.
  - γ'. Lower third of the ear-keel slightly thickened, not flattened externally.
    - γ''. Tragus quadrate ...... 10. *N. angolensis*, p. 724.
  - δ'. Lower third of the ear-keel much thickened and flattened externally.
    - δ''. Tragus narrow, much longer than broad, rounded off above .... 11. *N. miarensis*, p. 725.
    - ε''. Tragus quadrate ...... 12. *N. mops*, p. 726.
- e'''. Ears conjoined by a very deep band anteriorly, and, posteriorly, by a second low band .... 13. *N. johorensis*, p. 726.

- b. Integument of the ears thin, translucent; keel of the ear-conch slender, deep, bent backwards on itself.
  - a'. Antitragus separated by a deep notch; lower incisors 4.
    - a''. Muzzle thick, not concave in front of the eyes; upper lip with vertical wrinkles.
      - a'''. Ears separate; a large gular sac ... 14. *N. australis*, p. 728.
      - b'''. Ears united by a low band near the extremity of the muzzle; no gular sac .... 15. *N. megalotis*, p. 728.
    - b''. Muzzle concave between the eyes and extremity of the nose; upper lip furrowed by deep oblique wrinkles; ears united on the forehead slightly in front of the eyes; no gular sac.
      - c'''. Ears united by a deep band, antitragus much longer than high ... 16. *N. macrotis*, p. 729.
      - d'''. Ears united by a low band; antitragus as high as long .... 17. *N. gracilis*, p. 731.
  - b'. Antitragus separated by a very shallow notch; lower incisors 6.
    - c''. Muzzle flat in front of the ears; upper lips with vertical wrinkles.
      - e'''. Ears separate.
        - α. Tragus quadrate, broad above; first upper premolar in the centre of the space between the canine and second premolar ... 18. *N. brasiliensis*, p. 731.
        - β. Tragus triangular, narrow above; first upper premolar larger, filling up the space between the canine and second premolar ... 19. *N. norfolcensis*, p. 732.

II. Premolars $\frac{1-1}{2-2}$.

- c'. Antitragus separated by a very shallow notch, lower incisors 6.
  - d''. Muzzle flat or rounded off above; upper lip with ill-defined vertical wrinkles.
    - f'''. Ears separate, tragus triangular, rounded off above.
      - α. Ear broad above, upper third of the inner margin straight ...... 20. *N. albiventer*, p. 733.
      - β. Ear narrow above, upper third of the inner margin deeply concave 21. *N. acetabulosus*, p. 734.

Inc. $\frac{2}{4}$ *or* $\frac{2}{6}$; *pm.* $\frac{2-2}{2-2}$; *ears united or close together.*
(Subgen. NYCTINOMUS, Peters.)

1. NYCTINOMUS AFRICANUS.

Nyctinomus africanus, Dobson, Ann. & Mag. Nat. Hist. ser. 4, vol. xviii. p. 348 (1876).

Ears large, their inner margins arising from perfectly distinct points of origin though close together, outer and inner margins of the ear-conch regularly convex, forming an arc of a circle; antitragus irregularly quadrilateral with a broad base, separated posteriorly by a moderately deep notch, upper margin straight or even slightly concave; tragus broad, evenly rounded off above; keel of the ear very prominent, thickened and flattened externally in lower third.

Fur bright orange-chestnut above and beneath. The fur of the body extends upon the wing-membrane above almost as far as a line drawn from the middle of the humerus to the knee, and upon the base of the interfemoral membrane; the remainder of the upper surface is naked. Beneath, the fur scarcely extends so far outwards upon the wing-membrane between the humerus and femur as upon the upper surface; but a narrow band of short hairs passes outwards behind the posterior margin of the forearm to the carpus.

Lower incisors 4, not crowded; first upper premolar very short and blunt, but occupying by its base the whole space between the canine and second premolar.

Length: head and body 3″·4; tail 2″·4, tail free from membrane 1″·5; head 1″·2; ear 1″·0, tragus 0″·3 × 0″·15; forearm 2″·5; thumb 0″·4; second finger—metatarp. 2″·4, 1st ph. 1″·1, 2nd ph. 1″·3; third finger—metacarp. 2″·15, 1st ph. 0″·9, 2nd ph. 0″·35; fourth finger—metacarp. 1″·25, 1st ph. 0″·75, 2nd ph. 0″·3; tibia 0″·75; foot and claws 0″·45.

Hab. South Africa (Transvaal Republic). Type in the collection of the British Museum.

2. NYCTINOMUS CESTONI.

Dinops cestonii, Savi, Nuov. Giorn. de' Letter. p. 230 (1825); Bullet. des Sci. Nat. viii. p. 286 (1826); Temminck, Monogr. Mammal. i. p. 262 (1835–41).

Dysopes rüppellii, Temm. *l. c.* ii. p. 224.

Dysopes midas, Sundevall, Stockh. Vet. Ak. Handl. 1842, p. 207.

Dysopes cestonii, Wagner, Suppl. Schreb. Säugeth. v. p. 702; var. *nigrogriseus,* Schneider, Nouv. Mém. Soc. Helvét. xxiv. 1871, p. 9.

Nyctinomus insignis, Blyth, Cat. Mamm. Mus. A. S. Beng. (1863).

Nyctinomus (Dysopes) ventralis, Heuglin, Nova Acta Acad. Leop.-Carol. 1861, p. 11*.

Dysopes (Molossus) rueppelli, Swinhoe, P. Z. S. 1870, p. 619.

Nyctinomus cestonii, Dobson, Mon. As. Chiropt. p. 180 (1876).

Ears united by the bases of their inner margins on the muzzle at a short distance from the extremity of the nose, their round superior and internal margins projecting slightly beyond the end of the muzzle (fig. 4); general form of the ear-conch and tragus as in preceding species; but the tragus is proportionally larger, and the antitragus is obliquely triangular and separated posteriorly by a deep notch. Upper lips very thick, with well-marked vertical wrinkles (fig. 4). Males with a small glandular gular sac, opening in the centre of the inferior surface of the neck, slightly in front of the anterior extremity of the sternum, by a circular orifice concealed by the fur.

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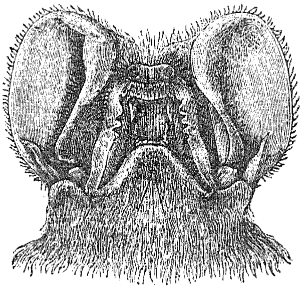
* The type of *N. ventralis* is preserved in the Stuttgart Museum, and, Dr. Krauss informs me, is identical with *N. cestoni.*

Fig. 4.



Head of *Nyctinomus cestoni*.

Wings from the distal third of the tibia.

Fur, above, reddish-brown with an orange tinge, the extreme tips of the hairs greyish; beneath, similar but paler. The wing-membrane on the upper surface is covered as far as a line drawn from the middle of the humerus to the knee, and the base of the interfemoral membrane; the antebrachial membrane is clothed with short fur; the forearm, legs, and remainder of the wings naked. Beneath, the fur extends outwards to a less distance, ending by an abrupt well-defined, straight margin; the antebrachial membrane is naked. The lower margin of the upper lip is fringed with fine hairs; the face is almost naked; a few short hairs form an arch on the inner side of the ear-conch; and the cutaneous band connecting the inner sides of the ears with the muzzle is clothed with erect hairs.

First upper premolar minute, acutely pointed, in the centre of the space between the canine and second large premolar; lower incisors 6, the central pair in front of next two, which touch the small incisors on each side next the canines, but do not overlap them.

Length (of an adult ♂): head and body 3″·4; tail 2″·0, tail free from membrane 1″·1; head 1″·3; ear 1″·2, tragus 0″·25 × 0″·20; forearm 2″·4; thumb 0″·35; second finger—metacarp. 2″·4, 1st ph. 0″·95, 2nd ph. 1″·25; third finger—metacarp. 2″·2, 1st ph. 0″·8, 2nd ph. 0″·5; fourth finger—metacarp. 1″·3, 1st ph. 0″·7, 2nd ph. 0″·3; tibia 0″·75; foot and claws 0″·4.

Hab. Europe (Switzerland, Italy, Sicily, Greece); Africa (Egypt, Nubia); Asia (Amoy, China).

3. Nyctinomus ægyptiacus.

Nyctinomus ægyptiacus, Geoffroy, Descr. de l'Egypte, ii. p. 128, pl. ii. (1812).

Dysopes geoffroyi, Temminck, Monogr. Mammal. i. p. 226 (1835–41); Wagner, Suppl. Schreb. Säugeth. i. p. 469 (1844).

Much smaller than *N. africanus*. Ears quite separate, but close together by the bases of their inner margins; outer and inner margins of the ear-conch evenly convex, forming almost an arc of a circle above; antitragus half-oval, separated by a deep notch posteriorly; tragus broad and rounded off above as in the preceding species. Lips with vertical wrinkles.

Wing-membrane from the lower part of the tibiæ, near the ankles.

Fur, deep smoke-brown above, paler beneath. Distribution of hair on the membranes as in *N. cestoni*, except on the antebrachial membrane, which is nearly naked.

Length (of the type, an adult ♂ specimen preserved in alcohol): head and body 2″·6; tail 1″·6, tail free from membrane 0″·9; head 0″·95; ear 0″·9, tragus 0″·23 × 0″·15; forearm 1″·95; thumb 0″·28; second finger—metacarp. 1″·9, 1st ph. 0″·75, 2nd ph. 0″·8; third finger—metacarp. 1″·8, 1st ph. 0″·6; 2nd ph. 0″·4; fourth finger—metacarp. 1″·15, 1st ph. 0″·55, 2nd ph. 0″·3; tibia 0″·5; foot and claws 0″·35.

Hab. Africa (Egypt). Type in the collection of the Paris Museum.

4. Nyctinomus tragatus.

Nyctinomus tragatus, Dobson, J. A. S. B. 1874, p. 143, Monograph Asiatic Chiroptera, p. 181 (1876).

This species resembles *N. ægyptiacus* very closely, but is larger, and has always six lower incisors. That this is not due to age (as the young have generally six lower incisors, even in species in which four is the normal number in the adult animal) is shown by the relative measurements of this species and *N. ægyptiacus*, and by the presence in every specimen (as yet examined) of this species of six lower incisors.

Length: head and body 2″·9; tail 1″·7, tail free from membrane 0″·85; ear 0″·9, tragus 0″·23 × 0″·15: forearm 2″·0; second finger 3″·6; fourth finger 1″·9; tibia 0″·6; foot and claws 0″·35.

Hab. Peninsula of India (Rajanpur, N.W. frontier; Jashpur near Chutia Nagpur; Calcutta).

Type in the collection of the Indian Museum, Calcutta.

5. Nyctinomus plicatus.

Vespertilio plicatus, Buchanan-Hamilton, Trans. Linn. Soc. v. p. 261, fig. (1800).

Nyctinomus bengalensis, Geoffr. Descr. de l'Egypte, ii. p. 130 (1812).

Nyctinomus tenuis et *N. dilatatus*, Horsfield, Zoolog. Researches in Java (1825); Cantor, J. A. S. B. xv. p. 179.

Dysopes murinus, Gray, Illustr. Ind. Zool. vol. i. pl. i. (1830.)

Dysopes plicatus, Temminck, Monogr. Mamm. i. p. 223 (1835–41).

Dysopes tenuis, Temminck, *l. c.* p. 228.
Nyctinomus plicatus, Jerdon, Mammals of India, p. 33 (1867); Dobson, J. A. S. B. 1874, p. 143; Monogr. Asiat. Chiropt. p. 182 (1876).

About the same size as *N. ægyptiacus*; but the ears are united by a low band in front, which forms an obtuse, slightly elevated, angular projection on the muzzle, and the tragus is very small, quadrate, the superior margin slightly concave, the outer margin with a small projection at the base; margin of the ear-conch evenly and broadly rounded off above; antitragus half oval, separated posteriorly by a deep notch. Upper lip very thick, deeply grooved by vertical wrinkles.

Wing-membrane from the lower end of the tibia.

Fur very dense and soft; above bluish-black or smoke-black, beneath somewhat paler.

First upper premolar small, in the space between the canine and second premolar.

Length (of an adult ♂): head and body 2″·9; tail 1″·7, tail free from membrane 1″·1; head 1″·0; ear 0″·9, tragus 0″·1 × 0″·03; forearm 1″·95; second finger 3″·9; fourth finger 1″·7; tibia 0″·7; foot and claws 0″·35.

Hab. Peninsula of India (Calcutta, Ludiana, Agra, Madras); Sumatra; Java; Borneo; Malay peninsula (Singapore); Philippine Islands.

6. NYCTINOMUS BIVITTATUS.

Nyctinomus bivittatus, Heuglin, Nova Acta Ac. Leop.-Car. 1861, p. 13.

Ears conjoined by a low band, very slightly raised above the muzzle; tragus very small, quadrate; upper lip grooved by vertical wrinkles.

Base of the thumb with a remarkably large circular callous pad. Wings from the middle of the tibiæ.

Fur above umber-brown; the extremities of the hairs conspicuously tipped with grey, especially on the top of the head, where either side is streaked with grey, and on the shoulders and middle of the back spotted over with the same colour; beneath similar but paler. Distribution of the fur and dentition as in *N. plicatus*.

Length (of the type specimen, an adult ♂): head and body 2″·7; tail 1″·6; tail free from membrane 1″·15; head 1″·0; ear 0″·8; tragus 0″·1; forearm 1″·9; thumb 0″·35; second finger 3″·8; fourth finger 1″·8; tibia 0″·6; foot and claws 0″·4.

Hab. N.E. Africa (Bogos Land). Type in the collection of the Stuttgart Museum.

This species is very closely allied to *N. plicatus*, of which it may be considered the African representative.

7. NYCTINOMUS BRACHYPTERUS.

Dysopes brachypterus, Peters, Reise nach Mossambique, Säugeth. p. 59 (1852).

Ears much shorter than the head, conjoined by a deep band on the muzzle as far forward as a point corresponding to the position of the upper incisors beneath; outer and inner margins continuous, evenly convex above, the inner margin with three minute horny points; antitragus well developed, separated by a deep notch, quadrangular with shortly rounded angles, the length of its base but slightly exceeding the depth of its anterior margin; tragus small, quadrate, its superior margin directed upwards and inwards, a small projection at the base of its outer margin; keel of the ear-conch large, thickened, expanded, and flattened externally in its lower third. Extremity of the nose projecting very much, the distance from the anterior margin of the nostril to the margin of the upper lip exceeding the diameter of the base of the antitragus; upper lip with vertical wrinkles.

Wings-membrane from the middle of the tibia.

Fur very short above and beneath; dark brown above, the base of the hairs whitish; beneath dirty yellowish-white, the sides of the body brown.

The first upper premolar stands in the tooth-row and fills up the narrow space between the canine and second premolar; lower incisors very small, not occupying all the space in front of the canines.

Length (of an adult ♀ specimen): head and body 2″·25; tail 1″·25, tail free from membrane 0″·8; head 0″·9; ear 0″·7, tragus 0″·1 × 0″·03; forearm 1″·35; thumb 0″·3; second finger—metacarp. 1″·35, 1st ph. 0″·55, 2nd ph. 0″·7; third finger—metacarp. 1″·3, 1st ph. 0″·45, 2nd ph. 0″·35; fourth finger—metacarp. 0″·8, 1st ph. 0″·35, 2nd ph. 0″·15; tibia 0″·45; foot and claws 0″·3.

Hab. Africa (Sierra Leone, Lagos, Mozambique). Type in the collection of the Berlin Museum.

8. NYCTINOMUS PUMILUS.

Dysopes pumilus, Cretzsch., Rüppell, Atlas, Reise nördl. Afrika, Zool. p. 69, pl. xxvii. (1826); Temminck, Monogr. Mamm. ii. p. 354 (1835–41); Wagner, Suppl. Schreb. Säugeth. i. p. 470 (1844).

Ears shorter than the head, united upon the muzzle as in the preceding species, but by a deeper band; outer and inner margins of the ear-conch continuous, evenly rounded above, the inner margin with three minute horny points; antitragus half-oval, arising abruptly from a point behind and on the same level with the angle of the mouth, directly below the posterior commissure of the eyelids, separated posteriorly by a narrow moderately deep notch; tragus small, quadrate, superior margin straight, parallel to the base of the tragus; keel of the ear-conch small, straight, not expanded in lower third. Extremity of the muzzle not projecting as much as in the preceding species, the distance from the anterior margin of the nostril to the margin of the upper lip not exceeding the length of the base of the antitragus; upper lip very expansible, with deep vertical wrinkles.

Wing-membrane from the distal third of the tibia.

Fur rather short, but longer than in the preceding species; above, whitish at the base, then dark brown to the tips of the hairs; beneath, less white at the base of the hairs, but slightly greyish at the tips.

Distribution of the fur upon the wing-membrane as in *N. cestoni*; a narrow band of short hairs behind the anterior two thirds of the forearm on the upper surface.

In ♂ a thick tuft of long hairs arises from the back of the deep band connecting the ears; in ♀ this hair is not longer than on the adjoining inner sides of the backs of the ears.

Lower incisors very small, crowded; first upper premolar minute, with an acute cusp, in the centre of the space between the canine and second premolar.

Length (of an adult ♂): head and body 2″·1; tail 1″·25, tail free from membrane 0″·75; head 0″·8; ear 0″·65, tragus 0″·× 1 0″·03; forearm 1″·5; thumb 0″·7; second finger—metacarp. 1″·4, 1st ph. 0″·6, 2nd ph. 0″·7; third finger—metacarp. 1″·35, 1st ph. 0″·5, 2nd ph. 0″·4; fourth finger—metacarp. 0″·85, 1st ph. 0″·4, 2nd ph. 0″·2; tibia 0″·5; foot and claws 0″·25.

Hab. Africa (Abyssinia, Nubia, Egypt).

9. NYCTINOMUS LIMBATUS.

Dysopes limbatus, Peters, Reise nach Mossambique, Säugeth. i. p. 56 (1852).

Nyctinomus leucogaster, Grandidier, Rev. et Mag. Zool. 1869, p. 337.

This form can be distinguished from *N. pumilus* only by the different colour of the fur of the ventral surface and of the wing-membranes, and by the slightly broader tragus. In every other respect it agrees so perfectly in structure and measurements with that species, that I can scarcely consider it specifically distinct.

Fur above dark brown, also the shoulders, throat, and upper part of the breast; the remaining parts of the ventral surface pale yellowish white, and the wing, antebrachial, and inferior surface of the interfemoral membrane of the same colour. In immature individuals the white colour of the ventral surface is not so much extended, but appears as a more or less broad patch on the abdomen, increasing in extent according to age.

Hab. Africa, south of the Equator (Zanzibar, Mozambique, Angola); Madagascar.

This appears to be the southern representative of *N. pumilus.*

10. NYCTINOMUS ANGOLENSIS.

Nyctinomus angolensis, Peters, Jorn. Scien. Mathem. Phys. e Natur. Lisboa, vol. iii. p. 124 (1870).

Ears much shorter and more triangular than in any of the species previously described, conjoined on the muzzle by a very deep band, as in *N. pumilus*; the antitragus and keel of the ear-conch as in that species; integument of the ears thick; tragus very small, quadrate, superior margin directed upwards and outwards. Upper lip remarkably thick in front, so that the extremity of the nose does not project much beyond its margin, its sides grooved by vertical furrows.

Thumb long; feet large; wing-membrane from the middle of the tibiæ.

Fur above and beneath very short; above white at the base, terminal three fourths of the hairs deep reddish-brown; beneath, yellowish-white or pale reddish-yellow; the shoulders, sides of the neck, chest, and abdomen reddish brown. On the upper surface the membranes are almost quite naked; beneath, the wing-membrane is covered with very short fine pale yellowish-white hairs as far outwards as a line drawn from the middle of the humerus to the knee; and similar short fur appears upon the interfemoral membrane.

First upper premolar very small, scarcely visible without the aid of a lens, in the outer angle between the closely approximated canine and second premolar; sometimes deciduous. Lower incisors crowded. Length (of an adult ♀): head and body 2″·9; tail 1″·8, tail free from membrane 0″·95; head 1″·05; ear 0″·75, tragus 0″·1 × 0″·03; forearm 1″85; thumb 0″·45; second finger—metacarp. 1″·85, 1st ph. 0″·85, 2nd ph. 1″·25; third finger—metacarp. 1″·8, 1st ph. 0″·7, 2nd ph. 0″·65; fourth finger—metacarp. 1″·2, 1st ph. 0″·55, 2nd ph. 0″·22; tibia 0″·65; foot and claws 0″·4.

Hab. Africa (Angola, Coanza river); Madagascar (Mahanora).

Nyctinomus hepaticus, Heuglin (Nov. Act. Acad. Leop.-Car. xxiii. 1864, p. 14), appears from the original description to be very closely allied to, if not identical with, *N. angolensis*. But Dr. Krauss informs me that the type is not in the Royal Zoological Museum at Stuttgart, where the types of the other species of Bats described by Herr von Heuglin are preserved; and he doubts whether any specimen of the species was brought by the describer to Europe. As the description is very imperfect, and as the type cannot be found, this species must remain doubtful.

11. NYCTINOMUS MIARENSIS.

Nyctinomus miarensis, Grandidier, Rev. et Mag. Zool. 1869, p. 337.

Nyctinomus unicolor, Grandidier, *l. c.* 1870, p. 49.

About the same size as *N. cestoni*. Ears shorter than the head, united on the muzzle by a band about 0″·15 high in the centre, at a distance of 0″·2 behind the extremity of the nose; ear-conch broadly rounded off above, the outer and inner margin continuous; antitragus longer than high, irregularly quadrate, the shortest side above, separated by a deep notch posteriorly; tragus narrow, much longer than broad, shortly rounded off above, inner margin slightly concave, outer straight, in general shape altogether different from that of any of the previously described species; keel of the ear-conch well developed, prominent, thickened and expanded in lower third, upper lip very expansible, deeply grooved by vertical furrows.

Thumb short, with a large circular callosity. Wings from the lower end of the tibiæ. Fur above dark brown, beneath brown with slightly ashy extremities.

Lower incisors 4, the middle incisors overlapping the outer ones;

first small upper premolar crushed in between the canine and second premolar, and rather to the outer side.

Length (of an adult ♀ specimen, the type): head and body 3″·5; tail 1″·65, tail free from membrane 1″·0; head 1″·3; ear 1″·0, tragus 0″·15 × 0″·4; forearm 2″·4; thumb 0″·35; second finger—metacarp. 2″·4, 1st ph. 0″·5, 2nd ph. 1″·4; third finger—metacarp. 2″·25, 1st ph. 0″·85, 2nd ph. 0″·6; fourth finger—metacarp. 1″·35, 1st ph. 0″·75, 2nd ph. 0″·3; tibia 0″·7; foot and claws 0″·5.

Hab. Madagascar. Type in the Paris Museum.

12. NYCTINOMUS MOPS.

Dysopes mops, F. Cuvier, Dents des Mammif. p. 49 (1825).

Mops indicus, Lesson, Table du Règne Anim. Mamm. p. 18 (1842); Peters, Monatsb. Akad. Berl. 1869, p. 402.

Nyctinomus mops, Dobson, Monogr. Asiatic Chiroptera, p. 182 (1876).

Ears larger than in *N. angolensis*; upper three fourths of the margin of the ear-conch regularly convex, forming almost an arc of a circle; inner margins conjoined by a deep band 0″·2 high in the centre; tragus very small, quadrate; antitragus large, quadrilateral with rounded angles, nearly as high as long, separated posteriorly by a deep notch, ending abruptly anteriorly, close to the angle of the mouth. Upper lip with deep vertical wrinkles.

Thumb rather long, armed with a well-developed claw; wings from the lower third of the tibia.

Fur very short above and beneath; on the dorsal surface dark brown, somewhat paler beneath, extending upon the wing-membrane along the sides of the body only.

Upper incisors short, separated by a small interval in front; lower incisors 4, crowded; first upper premolar very small, deciduous, in the outer angle between the closely approximated canine and second premolar.

Length (of the type specimen): head and body 3″·0; tail 1″·5, tail free from membrane 0″·95; ear 0″·95, tragus 0″·1; forearm 1″·8; thumb 0″·4; second finger 3″·5; fourth finger 1″·8; tibia 0″·7; foot and claws 0″·45.

Hab. Sumatra.

This species is closely allied to *N. angolensis*, agreeing with it in the position of the minute first upper premolar (which is quite external to the tooth-row), in the remarkable length of the thumb as compared with other species of this genus (except *N. johorensis*), and in the peculiar shortness of the fur. It is, however, readily distinguished by the form and size of the ears, and by other characters described above.

13. NYCTINOMUS JOHORENSIS.

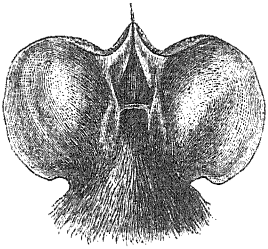
Molossus (Nyctinomus) johorensis, Dobson, Proc. Asiat. Soc. Beng. 1873, p. 22.

Nyctinomus (Chærephon) johorensis, Dobson, Journ. Asiat. Soc. Beng. 1874, p. 144.

Nyctinomus johorensis, Dobson, Monogr. Asiat. Chiroptera, p. 183 (1876).

Ears as in *N. plicatus*; but their inner margins are connected by a band of integument which extends forwards on the muzzle as far as a point placed midway between a line joining the eyes and the extremity of the muzzle; this connecting band is continued upwards and backwards between the ears to a height of 0″·4 inch, forming an incomplete funnel open behind, wide below, and narrow above. At a distance of about 0″·3 inch from the anterior connecting band, the ears are again connected by a second fold of integument, posterior and parallel to the first, about 0″·1 inch in vertical height (fig. 5). Between these two connecting folds of integument and the sides of the ear a hollow square is contained. This concavity is empty, and open only from above. At the base of the funnel-shaped anterior boundary a few long hairs exist, as in *N. pumilus*. Margin of the ear-conch evenly convex above; antitragus large, separated by a deep notch; tragus very small, quadrate, superior margin slightly concave.

Fig. 5.



Head of *N. johorensis*.

The animals of this genus possess the power of folding the ear-conch forwards, downwards, and outwards, thus closing the external ear. When the ears are closed, the superior part of the funnel-shaped connecting band is, in this species, drawn forwards, disclosing the cavity behind. In the erect condition of the ears the same funnel-shaped process is drawn backwards across this square hollow cavity, which it covers, as the pitcher of *Nepenthes* is covered by the leaf forming its lid. In this position the extremity of the funnel is flattened out, and lies in the space contained between the posterior connecting band and the top of the head.

The thumb is comparatively longer than in any other species of the genus, and the wing-membrane is attached a short distance below the knee-joint.

Upper incisors separated by a very narrow interval in front; lower incisors 4.

Length: head and body 2″·8; tail 1″·7, tail free from membrane 1″·0; ear 0″·9, tragus 0″·1; forearm 1″·9; thumb 0″·5: second finger 3″·6; fourth finger 1″·8; tibia 0″·7; foot and claws 0″·4.

Hab. Malay peninsula (Johore).

Type in the collection of the Indian Museum, Calcutta.

14. NYCTINOMUS AUSTRALIS.

Molossus australis, Gray, Mag. Zool. Bot. ii. p. 501 (1838).

Ears large, but shorter than the head, their inner margins arising close together on the muzzle from distinct points of origin, as in *N. africanus*; integument forming the ear-conch rather thin; keel very deep in lower third, but short and exceedingly thin, bent upwards and backwards; margin of the conch straight or slightly concave in superior third; antitragus very large, as high as long, posterior margin straight, anterior slightly convex, narrowly rounded off above; tragus short and broad as in *N. ægyptiacus*; but its outer margin is distinctly concave about the middle, and there is an obtuse projection at its base. Upper lip with short vertical wrinkles. The mouth of a very large gular sac, larger than in any other known species of this genus, extends across the throat from a point on each side near the anterior termination of the antitragus, opening forwards as in *Taphozous*.

Wings from the distal third of the tibia. Fur moderately long; above dark reddish-brown, beneath paler; the base of the hairs on both surfaces much lighter. On the dorsal surface the wings are covered as far as a line drawn from the middle of the humerus to the distal third of the femur, also the base of the interfemoral as far as a line drawn between the knees; beneath, a narrow band of fur extends outwards behind the forearm, becoming wider in the angle between the forearm and the fifth metacarpal bone, along which it extends for half its length, and, passing over, covers the space between it and the upper third of the fourth metacarpal.

Upper incisors rather long, separated by a narrow space in the middle; lower incisors 4, bifid: first upper premolar minute, in the space between the canine and second premolar, drawn slightly inwards.

Length (of an adult ♂ specimen, the type): head and body 3″·0; tail 1″·9, tail free from membrane 1″·0; head 1″·15; ear 0″·9, tragus 0″·2×0″·15; forearm 2″·35; thumb 0″·35; second finger—metacarp. 2″·25, 1st ph. 0″·9, 2nd ph. 1″·2; third finger—metacarp. 2″·1, 1st ph. 0″·7, 2nd ph. 0″·55; fourth finger—metacarp. 1″·2, 1st ph. 0″·7, 2nd ph. 0″·25; tibia 0″·75; foot and claws 0″·5.

Hab. Australia; New Guinea.

Type in the collection of the British Museum.

15. NYCTINOMUS MEGALOTIS, n. sp.

Ears nearly as long as the head, projecting when laid forwards nearly one fifth of an inch beyond the muzzle; inner margins united on the muzzle by a low band at a distance from the end of the nose equal to the length of the base of the antitragus; inner and outer margins of the ear-conch evenly convex above; ear-keel very deep and slender in lower third, where it is partly folded upwards and backwards, so as to present a flat surface externally; superior and inner margin of the conch with four minute horny projections; antitragus rather small, but separated posteriorly by a deep notch, convex, about once and a half as long as high; tragus quadrate, with a straight superior margin and projecting outer angle, inner margin straight, outer slightly concave. Extremity of the muzzle very obliquely truncate. Upper lip very expansible, with a few deep vertical grooves. No gular sac. Thumbs and feet small. Wings from the lower end of the tibiæ.

Fur dark brown above and beneath, with slightly greyish extremities; the base of the hairs whitish. The face is nearly naked; a few hairs form a fringe along the anterior margin of the upper lip beneath the nostrils. With the exception of a narrow band of very short fine hairs, which extends on the upper surface of the wing-membrane behind the forearm to the carpus, the membranes external to the humerus appear to be quite naked; along the sides of the body the fur extends as far outwards, above and beneath, as a line drawn from the middle of the humerus to the knee.

Upper incisors separated by a space in front; lower incisors 4, bifid, crowded; internal basal cusp of canine small; first upper premolar small, conical, acutely pointed, in the centre of the rather wide space between the canine and second premolar; second upper premolar with an acute internal basal cusp; first lower premolar not crowded, as broad at the base as the second, which exceeds it (as in all other species of the genus) in vertical extent.

Length (of an adult ♂): head and body 3″·0; tail 2″·1, tail free from membrane 1″·1; head 1″·15; ear 1″·0, tragus 0″·15 × 0″·1; forearm 2″·35; thumb 0″·35; second finger—metacarp. 2″·25, 1st ph. 0″·95, 2nd ph. 1″·1; third finger—metacarp. 2″·1, 1st ph. 0″·8, 2nd ph. 0″·1; fourth finger—metacarp. 1″·1, 1st ph. 0″·75, 2nd ph. 0″·2.

Hab. Surinam. Type in the collection of the British Museum.

16. NYCTINOMUS MACROTIS.

Nyctinomus macrotis, Gray, Ann. & Mag. Nat. Hist. 1839, p. 5; Gervais, Expéd. Castelnau, Zoologie, p. 62, pl. xii. figs. 1 and 1 *a* (skull and teeth).

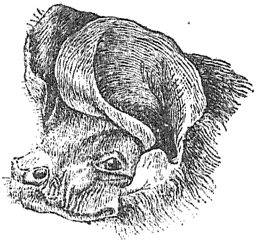
Dysopes auritus, Natt., Wagner, Wiegm. Archiv, 1843, p. 368; Burmeister, Thiere Brasiliens, p. 69 (1854).

Dysopes laticaudatus et *D. cæcus*, Rengger, Säug. Paraguay, p. 88.

? *Dysopes aurispinosus*, Peale, United-States Explor. Exped. viii. p. 21.

Ears large, nearly as long as the head, conjoined to a height of 0″·2 inch, the inner margins very convex and consequently close together for more than half their length above the band uniting their bases; integument forming the ear-conch very thin, translucent; keel very deep, projecting outwards beyond the antitragus, but also very slender, curved backwards and upwards; tragus small, quadrate, superior margin straight or very slightly concave, upper half of outer margin concave, lower half forming a prominent angular projection; antitragus considerably longer than high, terminating in front between the eye and the angle of the mouth (fig. 6), separated posteriorly by a deep notch. Face deeply grooved horizontally beneath the eye, which is remarkably prominent and directed forwards. Muzzle slender, concave between the ears and the projecting, sharply cut superior margin of the nostrils; nasal apertures directed almost laterally, separated by a wide space, which is divided in the middle by a raised vertical ridge. Upper lip deeply furrowed by oblique wrinkles. No gular sac. Thumb rather short, with a small callosity; terminal phalanx of third finger very short. Wings from the distal third of the tibiæ.

Fig. 6.



Head of *N. macrotis*.

Fur short, reddish brown above and beneath; on the upper surface extending upon the wing-membrane as far outwards as a line drawn from the middle of the humerus to the knee-joint, on the base of the interfemoral, and outwards behind the forearm in a narrow band to the carpus.

Teeth slender, with very acute cusps. Lower incisors 4, crowded, bifid. First upper premolar small, but acutely pointed, in the centre of the space between the canine and the second premolar; second premolar large, with a long and very acute internal basal cusp.

Length (of the type specimen, an adult ♀): head and body 2″·8; tail 1″·9, tail free from membrane 1″·0; head 1″·1; ear 1″·0, tragus 0″·15 × 0″·1; forearm 2″·2; thumb 0″·3; second finger—metacarp. 2″·1, 1st ph. 0″·9, 2nd ph. 1″·0; third finger—metacarp. 2″·0, 1st ph. 0″·75, 2nd ph. 0″·1; fourth finger—metacarp. 1″·0, 1st ph. 0″·7, 2nd ph. 0″·3; tibia 0″·65; foot and claws 0″·4.

Hab. Cuba; Brazil (Mato Grosso); Paraguay.

The next species, *N. gracilis*, resembles *N. macrotis* very closely in general structure, and forms with it a separate section of the genus, distinguished by the peculiar shape of the muzzle.

17. NYCTINOMUS GRACILIS.

Dysopes gracilis, Natt., Wagner, Wiegm. Archiv, 1843, p. 368; Suppl. Schreb. Säugeth. v. p. 708 (1855).

Nyctinomus gracilis, Peters, Monatsb. Akad. Berl. 1865, p. 573.

Ears conjoined by the bases of their inner margins only; general form of the ear-conch quite similar to that of *N. macrotis*; but the antitragus is higher than long, separated posteriorly by a very deep notch, and terminating abruptly in front near the angle of the mouth; tragus very small, quadrate, outer margin concave. Muzzle and remaining parts of the body as in *N. macrotis*. No gular sac. Fur short, dark brown above and beneath, extending upon the wing-membranes along the sides of the body only.

Length (of an adult ♂ specimen): head and body 2″·5; tail 1″·5, tail free from membrane 0″·7; head 0″·9; ear 0″·75, tragus 0″·1 × 0″·08; forearm 1″·8; thumb 0″·3; second finger—metacarp. 1″·7, 1st ph. 0″·75, 2nd ph. 0″·9; third finger—metacarp. 1″·65, 1st ph. 0″·65, 2nd ph. 0″·1; fourth finger—metacarp. 1″·0, 1st ph. 0″·5, 2nd ph. 0″·15; tibia 0″5; foot and claws 0″·35.

Hab. Brazil (Mato Grosso); Guatemala.

Although much smaller and with comparatively shorter ears, this species resembles *N. macrotis* so closely in its general structure that, at first sight, it appears to be a small variety of that species. On closer examination, however, it is easily distinguished by the very different form of the antitragus, and by the short connexion of the ears in front.

18. NYCTINOMUS BRASILIENSIS.

Nyctinomus brasiliensis, Is. Geoffroy, Ann. des Sci. Nat. i. p. 337 (1824); Gervais, Expédit. de Castlenau, Zoologie, p. 60, pl. xii. figs. 2 and 2 *a* (teeth), 1855; Peters, Monatsb. Akad. Berl. 1865, p. 573.

Nycticejus cynocephala, Le Conte, Cuv. Anim. Kingd. (McMurtrie ed.) (1831), p. 431.

Dysopes nasutus, Temminck, Monogr. Mamm. i. p. 234 (1835).

Nyctinomus multispinosus (Peale), Burmeister (*vide* Peters, *l. c.* 1865, p. 573).

Molossus cynocephalus et *fuliginosus*, Cooper, Ann. New-York Lyc. iv. 1837, pp. 65, 67.

Rhinopoma carolinense, Gundlach, *nec* Geoffroy, Wiegm. Archiv, 1840, p. 358.

Dysopes naso, Wagner, Supp. Schreb. Säugeth. i. p. 475 (1844); v. p. 707 (1855).

Nyctinomus mexicanus, Saussure, Rev. et Mag. Zool. 1860, p. 283.

Molossus aztecus, Saussure, *l. c.* p. 285*.

Nyctinomus musculus, Gundlach, Monatsb. Akad. Berl. 1861, p. 149.

Nyctinomus nasutus, Tomes, P. Z. S. 1861, p. 68; Allen, Monograph of the Bats of North America, p. 7 (1864).

Ears nearly as long as the head, laid forward they extend almost to the end of the nose; inner margins not united, but arising close together from the muzzle about midway between a line drawn between the eyes and the extremity of the nose; inner and outer margins of the ear-conch almost regularly convex, continuous; the inner margin with five or six minute horny projections; antitragus but slightly developed, separated posteriorly by a shallow and small notch; tragus quadrate, larger than in *N. gracilis.* Upper lip with numerous vertical wrinkles; muzzle in front of the origin of the inner margins of the ears flat, terminated by the sharply cut margins of the nostrils. No gular sac.

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* Prof. Peters informs me that *Molossus aztecus*, Saussure, included by him in his subgenus *Molossops* (=*Myopterus*), is really a synonym of *N. brasiliensis*, as he has since ascertained by direct examination of the type.

Wings from the distal third of the tibiæ near the ankles. Fur moderately long and very dense, extending upon the wings above and beneath as far outwards as a line drawn from the middle of the humerus to the knee, the remainder naked. Lower incisors six, crowded; the outer incisors very slender, overlapping the external margin of the middle incisors, the internal margins of which are also overlapped by the central incisors; first upper premolar small, with an acute cusp well elevated above the gum in the centre of the small space between the canine and second premolar.

Length (of an adult ♀): head and body 2″·25; tail 1″·4, tail free from membrane 0″·8; head 0″·8; ear 0″·7, tragus 0″·15 × 0″·12; forearm 1″·7; thumb 0″·3; second finger—metacarp. 1″·65, 1st ph. 0″·65, 2nd ph. 0″·8; third finger—metacarp. 0″·65, 1st ph. 0″·55, 2nd ph. 0″·45; fourth finger—metacarp. 0″·8; 1st ph. 0″·5, 2nd ph. 0″·25; tibia 0″·5; foot and claws 0″·33.

Hab. The warmer regions of North and South America and their islands, extending from California to Chili; apparently everywhere distributed throughout the tropical and subtropical parts of America, where it is probably the most common species of the genus, as it has the widest range.

19. NYCTINOMUS NORFOLCENSIS.

Molossus norfolcensis, Gray, Ann. Nat. Hist. iv. p. 7 (1839).
Nyctinomus planiceps, Peters, Monatsb. Akad. Berl. 1866, p. 22.
Molossus wilcoxii, Krefft, List of Australian Bats (1871).

Ears triangular, shorter than the head, separate, their inner margins arising from distinct points of origin; inner margin of the conch almost straight, tip broadly rounded off, outer margin straight; antitragus scarcely distinguishable from the outer margin, a small almost imperceptible shallow notch indicating its commencement; tragus triangular, rounded off above. Muzzle flat, obtuse; the upper lip with shallow vertical wrinkles; nostrils opening sublaterally. Gular sac small, aperture circular, directed downwards; quite rudimentary in female. Wings from the ankles; the outer and inner toes equally enlarged.

Fur reddish brown above, paler beneath; base of the hairs much lighter. Above, a broad band of very short fur covers the wings behind the proximal four fifths of the forearm, but does not extend to the carpus.

Upper incisors long, widely separated at their bases, converging inwards and forwards; a blunt projection from the cingulum of each posteriorly. First upper premolar small, but much larger than in the other species of the genus, filling up the space between the canine and second premolar. Lower incisors six, deeply bifid; first lower premolar small and acutely pointed, its inner side partly covered by the expanded cingulum of the second premolar, as in *M. rufus*; second premolar double the size of the first, its cingulum directed obliquely forwards and upwards.

Length (of an adult ♀): head and body 2″·1; tail 1″·25, tail free from membrane 0″·6; head 0″·8; ear 0″·6, tragus 0″·15 × 0″·1; forearm 1″·35; thumb 0″·26; second finger—metacarp. 1″·3, 1st ph. 0″·55, 2nd ph. 0″·7; third finger—metacarp. 1″·25, 1st ph. 0″·45, 2nd ph. 0″·4; fourth finger—metacarp. 0″·9, 1st ph. 0″·35, 2nd ph. 0″·15; tibia 0″·4; foot and claws 0″·3.

Hab. Australia (New South Wales, Queensland); Norfolk Island.

Inc. $\frac{2}{6}$; *Pm.* $\frac{1-1}{2-2}$. *Ears separate, tragus triangular.*

(Subgen. MORMOPTERUS, Peters.)

20. NYCTINOMUS ALBIVENTER, n. sp.

Ears triangular, shorter than the head, inner margins arising from distinct points of origin from the forehead; inner margin of the ear-conch almost straight, slightly concave in upper third, tip rounded off, outer margin straight; antitragus scarcely defined, separated posteriorly by a very shallow notch; tragus nearly as broad opposite the base of its inner margin as high, irregularly triangular, rounded off above, very similar in shape to that of *N. norfolcensis*, but less triangular and broader above, an obtuse projection about the middle of its outer margin. Extremity of the muzzle projecting very much beyond the mandible, the end of the nose very prominent and distinct from the upper lip, nostrils opening almost laterally. Sides of the upper lip with vertical grooves not well defined. Gular sac small.

Wings from the lower third of the tibiæ or from the ankles; fifth toe somewhat smaller than the first.

Dentition similar to that of *N. acetabulosus* (to be described), but the lower incisors are not crowded.

Fur, above, white at the base, the remaining part dark brown; beneath, the greater part of the chest and abdomen dirty white, the sides brown. Wing- and interfemoral membrane nearly naked; a narrow band of fur extends outwards behind the forearm and along the proximal third of the fifth metacarpal bone.

Length (of an adult ♀, the type): head and body 2″·2; tail 1″·25, tail free from membrane 0″·7; head 0″·85; ear 0″·65, tragus 0″·15; forearm 1″·45; thumb 0″·35; second finger—metacarp. 1″·4, 1st ph. 0″·55, 2nd ph. 0″·7; third finger—metacarp. 1″·4, 1st ph. 0″·5, 2nd ph. 0″·35; fourth finger—metacarp. 0″·9, 1st ph. 0″·35, 2nd ph. 0″·15; tibia 0″·4; foot and claws 0″·3.

Hab. Madagascar.

Type in the British Museum.

21. NYCTINOMUS ACETABULOSUS.

Molossus acetabulosus, Commerson, MS. *Vide* Peters, Monatsb. Akad. Berl. 1869, p. 402.

Nyctinomus acetabulosus, Desmarest, Mammalogie, p. 117 (1820).

Nyctinomus natalensis, Smith, Zoolog. S. Africa, pl. 49.

Nyctinomus (*Mormopterus*) *jugularis*, Peters, P. Z. S. 1865, p. 468.

Ears quite separate, arising from the sides of the forehead at a short distance above and in front of the eye; the inner margin of the ear-conch slightly convex for two thirds its length, abruptly *concave* in upper third, so that the upper extremity of the ear is attenuated, and the subacute tip projects forwards and inwards, instead of backwards and outwards, as in most species of Bats; outer margin of the conch forming almost a straight line from the tip to its termination near the angle of the mouth, interrupted only by a slight emargination opposite the middle of the tragus, indicating the commencement of the antitragus; tragus nearly as broad as high, irregularly triangular, with a truncated vertical angle. Muzzle flat, extremity projecting considerably beyond the lower lip; sides of the upper lip with short ill-defined vertical wrinkles. In the male a large glandular sac in the centre of the inferior surface of the neck, in the female rudimentary.

Wings from the distal third of the tibiæ; the fifth toe not so much thickened as the first.

Fur dark reddish brown above, somewhat paler beneath. Upper incisors separate from the canines and also from each other; lower incisors small, slender, bifid, crowded; the second incisor on each side slightly overlapped by the margins of the first and third; canines without basal cusps; the single upper premolar separated by a narrow interval from the canine, with a projecting base internally, which is concave behind and anteriorly develops an acute cusp; first lower premolar unicuspidate, equal to three fourths the second in vertical extent.

Length (of an adult ♂): head and body 1″·9; tail 1″·7, tail free from membrane 0″·6; head 0″·75; ear 0″·6, tragus 0″·15; forearm 1″·55; thumb 0″·25; second finger—metacarp. 1″·5, 1st ph. 0″·6, 2nd ph. 0″·7; third finger—metacarp. 1″·5, 1st ph. 0″·5, 2nd ph. 0″·4; fourth finger—metacarp. 1″·15, 1st ph. 0″·4, 2nd ph. 0″·2; tibia 0″·4; foot and claws 0″·35.

Hab. S.E. Africa (Natal); Madagascar; Bourbon; Mauritius.

The three last-described species, *N. norfolcensis*, *N. albiventer*, and *N. acetabulosus*, differ from all the other species of the genus in the relative lengths of the metacarpal bones of the second and fourth fingers, resembling rather, in this respect, the species of the subgenus *Myopterus* (gen. *Molossus*). In all other species of *Nyctinomus* the metacarpal bone of the second finger is double the length of that of the fourth; in these three species, and in *Myopterus*, it is but one half longer. These species also agree together in the form of the tragus (in which they also differ from all other species of *Nyctinomus*, and resemble *Myopterus*), in their distinctly separated ears, in the possession of six lower incisors, and in the presence of a glandular gular sac. These characters appear sufficient to unite them in a subgenus at least. But *N. norfolcensis* has an additional upper premolar, which is even better developed than in other species of the genus, and therefore belongs to the subgenus *Nyctinomus*; while *N. albiventer* and *N. acetabulosus*, on account of the absence of this small premolar, are relegated to the subgenus *Mormopterus*.

It is therefore impossible, in a natural arrangement of the species, to separate *N. albiventer* and *N. acetabulosus* into a distinct subgenus characterized by the number of the upper premolars; for this would exclude *N. norfolcensis*, which is, undoubtedly, in all other respects, very closely allied to them, and forms with them a well-defined section of the genus.

3. Report on some of the Additions to the Collection of Mammalia in the British Museum. By Dr. ALBERT GÜNTHER, F.R.S., V.P.Z.S., Keeper of the Zoological Department.

[Received November 6, 1876.]

(Plates LXIX–LXXIV.)

1. *On a Collection from the Philippine Islands.*

A small collection made by Professor Steere in the Philippine Islands gives some additional information as regards the distribution of certain species in that group. It contains:—

Macacus philippinensis (Is. Geoffr.).

This Monkey was procured in the mountains of Mahayhay, in the island of Luzon, near Manila. Dr. Steere also shot the same species, or apparently the same, in the islands of Palawan, Mindanao, and Basilan. They go in large troops, and are often seen along the sea-shore, where they seem to be occupied in hunting for shell-fish and crabs.

Galeopithecus philippinensis (Waterh.), from Bojol.
Pteropus jubatus (Temm.), from Mindanao.
Tupaia javanica (Horsf.), from Palawan.
Viverra tangalunga (Gray), from Panay.
Sciurus exilis (S. Müll.), from Basilan (also found in Mindanao).
Sciurus steerii (sp. n.),

SCIURUS STEERII (Plate LXIX).

Dr. Steere's collection contained two examples of this apparently undescribed species, which greatly differ in coloration, but are structurally quite identical:—

1. A specimen obtained from Balabac (marked 6510) has the upper parts, sides of the body and outer side of the legs, of a rich chestnut-brown colour, the hairs being tipped with black, which gives the fur a grizzled appearance. All the lower parts are brownish red.

Hairs of the tail of moderate length, rather stiff, bright brownish red, each hair with a broad black ring.

2. The second specimen is from Puerto Princesa, Palawan (numbered 6798); it has the upper part of the head, the middle of the back, and the outer side of the legs grizzled with greyish brown and black, each hair having a black ring and black tip. Sides of the body similarly grizzled, but mixed with numerous white hairs. Lower parts pure white, with the exception of the root of the tail; anal region and borders of the white abdomen brownish red. Coloration of tail as in the first specimen, but with the tip black.

	Specimen 1. in.	Specimen 2. in.
Distance from end of snout to root of tail ..	9½	9
Length of tail........................	6½	7
Length of naked sole of hind foot........	1½	1½
Length of skull		2

2. *On a Collection from Borneo.*

Mr. H. Low has brought with him to England a second collection, from the same district in which the specimens described in a former paper (p. 424) were obtained. It contains two molar teeth of an adult Elephant undistinguishable from those of *Elephas indicus*. They had been evidently exposed for a long time to the deteriorating influences of the weather; and although Elephants are no longer found in the immediate vicinity of the west coast, Mr. Low has reliable information of their occurrence in the interior, and has no doubt of this animal being indigenous in Borneo, and not merely an importation.

The following species prove to be undescribed:—

LUTRA LOWII, sp. nov.

Entirely chocolate-brown, nearly black along the middle line of the back. Lips and chin to the level of the ears white, cheeks and throat brown. The white of the upper lip extends upwards nearly to the nostril, and is sharply defined towards the brown part of the snout. Bristles arising from brown parts are black, those from white parts white. Ears conspicuous.

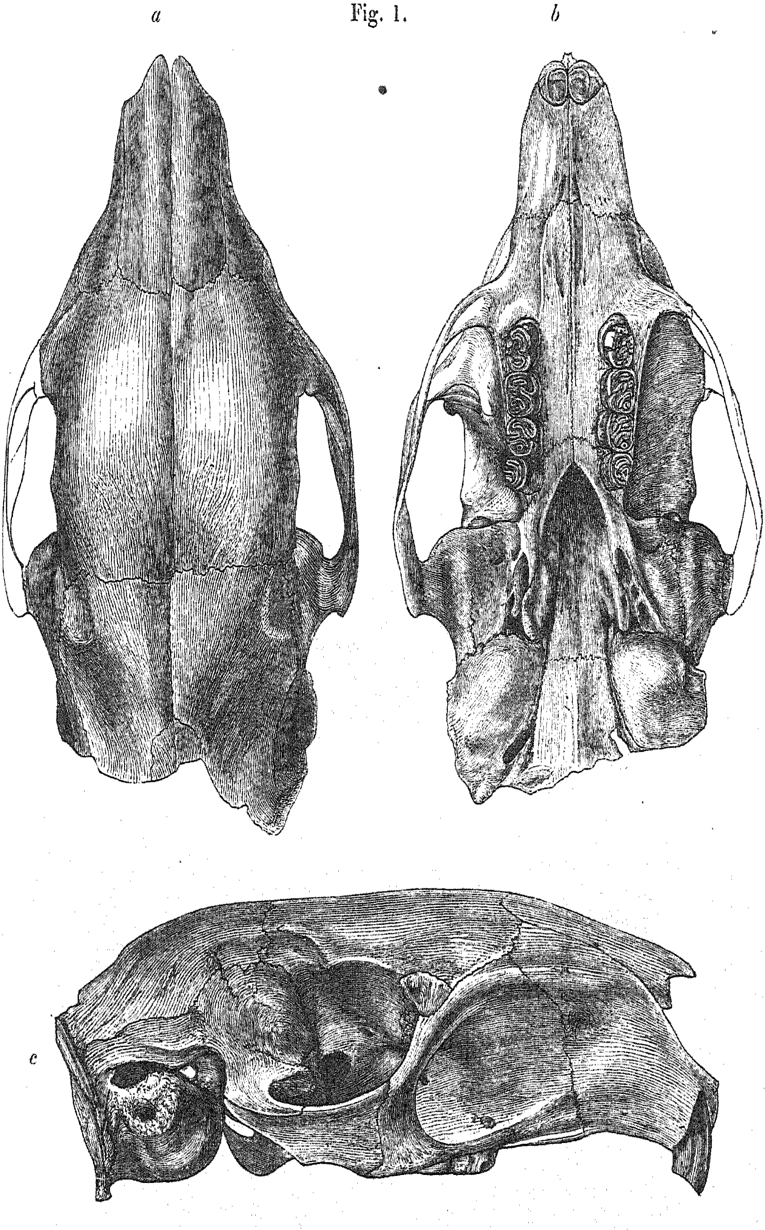
	in.
Distance of nose from vent......	23
Length of tail................	11

Distinguished from *Lutra simung* by its much shorter tail.

HYSTRIX CRASSISPINIS, sp. nov. (Plate LXX.)

This species, which belongs to the same section as *H. javanica* and the allied species, is distinguished from all by the great size and length of the quills, all of which, moreover, are more or less distinctly grooved above, or at least provided with ridges. It is conspicuously smaller than *H. javanica*, but agrees with it in being covered everywhere with stiff spines, except on the foremost part of the head and abdomen. The largest quills are, in the middle, about twice as thick

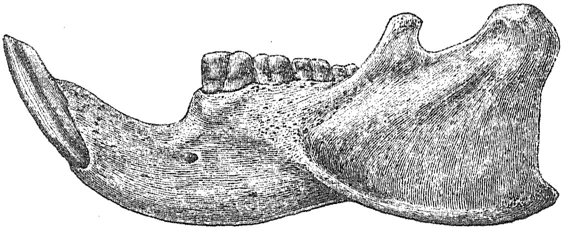
Fig. 1.



Skull of *Hystrix crassispinis.*

as an incisor. The prevailing hue of the head and fore part of the body is a greyish brown; but towards the large quills the spines are getting whitish at the tip and base. The basal half of the large quills is white, the apical half black with white tip. Slender quills white, with black subcentral ring. Legs blackish*.

Fig. 1a.



Lower jaw of *Hystrix crassispinis*.

	in.	lin.
Length of body from tip of nose to root of tail....	17	0
Length from nose to ear....................	3	6
Length of tail with terminal quills..............	6	0
Length of fore foot........................	2	0
Length of hind foot	3	0
Length of one of the largest quills..............	7	0
Length of one of the hollow caudal quills	6	0

Mr. Low brought home four specimens of this species. The existence of a Porcupine in Borneo has been repeatedly mentioned, for instance by Müller, Verhandl. Nat. Gesch. Ned. Överz. Bezitt. p. 36 (under the erroneous name of *Hystrix fasciculata*), and by W. Marshall, Proc. Zool. Soc. 1871, p. 235, who refers a very young example in the Leyden Museum to Marsden's *H. longicauda* from Sumatra. From the notes of the Dutch naturalists it is impossible to decide whether the specimens examined by them belong to our species, or whether a second species exists in the island, approaching in size, and perhaps identical with, the Sumatran or Malaccan form.

The *Skull* (figs. 1, 1a, pp. 737–8) is distinguished by the shortness of the nasal bones, which are shorter than, or as long as, the frontal suture. The anterior portion of the frontal region is not very convex. Ascending ramus of the intermaxillary broad, about as broad as one of the nasal bones. Infraorbital opening of comparatively moderate width. The palatal incision advancing forwards to the front margin of the hinder molar.

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* On the inner side of one of the skins, in which the subcutaneous tissues have been cleared away, the arrangement of the large quills may be distinctly seen. These quills are not uniformly distributed over the hinder half of the back, but their roots are collected in bundles of five, six, or seven, the bundles having the appearance of imbricated pectinated scales. The roots of the largest and thickest quills occupy the middle of each scale or bundle. A similar arrangement has been figured by F. Cuvier, Nouv. Ann. Mus. Paris, i. pl. xv. fig. 1.

I give some of the measurements of two skulls, one (A) being that of an old, the other (B) of a younger, though full-grown, individual.

	A. millim.	B. millim.
Total length	110	110
Length of nasal bone	33	36
Length of frontal suture	39	38
Least width of nasal bone	9	8
Length of fronto-intermaxillary suture	9	7
Least width of interorbital space	39	40
Distance between incisor and first molar	29	30
Length of upper molar series	24	25
Width of palate between the second molars	9	8

The skull of this species resembles much that figured by Blainville (Ostéogr. *Hystrix*, pl. ii.) under the name of *Atherura fasciculata*. I have not seen the skull of this species; but I should have expected it to be more similar to that of *A. macrura* than it would appear from Blainville's figure.

TRICHYS, g. n.

Allied to *Atherura*, but with the tail reduced to a scarcely perceptible projection of the skin. Dentition as in *Atherura*, but with the lower incisors more compressed. Facial portion of the skull compressed, without enlargement of the air-sinuses. A postorbital process.

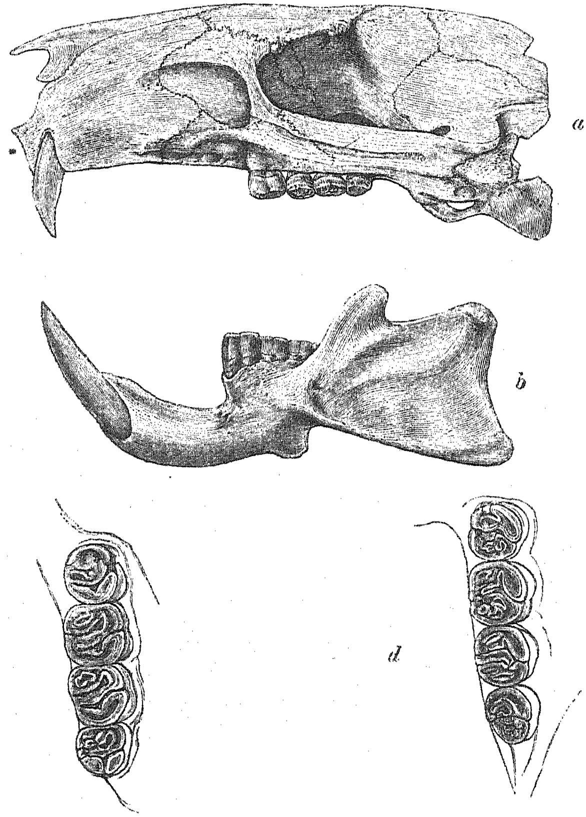
TRICHYS LIPURA, sp, n. (Plate LXXI.)

All the upper and lateral parts of the body are densely covered with flat flexible bristles of moderate length, grooved on the upper as well as lower surface. Underfur very scantily represented by fine woolly hairs; and on the rump some long hair-like bristles project beyond the flat ones. On the head and abdomen the bristles are replaced by flat stiff hairs. In the external form and structure of the head, ears, and feet there is no marked difference from *Atherura*, The general tint of the upper parts of the animal is brown, each spine being white at the base, and brown towards the point. On the sides the brown colour gradually passes into the white of the lower parts. Hairs of the long moustache black, the longest hairs having whitish terminations.

	in.	lin.
Total length	17	0
Distance from nose to ear	3	0
Length of ear	1	0
Length of sole of fore foot	1	6
Length of sole of hind foot	2	6
Length of one of the longest flat spines	1	8

Skull (figs. 2, 2^a, pp. 740–1).—The following notes refer chiefly to points in which *Trichys* differs from *Atherura*. Especially remarkable is the development of a postorbital process, and of the coronoid process, in which this form differs from most of the other members of the group of Porcupines.

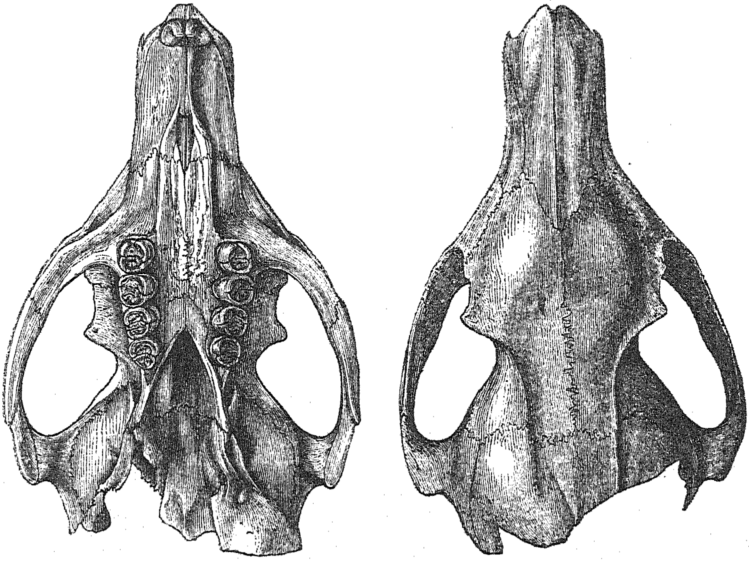
Fig. 2.



a. Skull of *Trichys lipura*, nat. size. *b*. Lower jaw, nat. size.
c. Lower molars; *d*. Upper molars: twice nat. size.

The facial portion of the skull is compressed and rather elongate, the nasal bones quite as long as the frontal suture, and extending far more backwards than the suture between intermaxillary and frontal. Frontals rather flat above, with projecting postorbital process, behind which the skull is constricted. The zygomatic arch is strong, deeply channelled along its whole length, and expanded along its lower edge; malar with projecting infero-posterior angle. Palate with a projecting ridge on each side, commencing from the first molar, the ridges converging in front of the foramina incisiva. Palatal notch opposite to the space between the third and fourth molars. Coronoid process well developed, rising above the level of the condyle. A very conspicuous projection on the lower edge of the mandible marks the boundary between the incisive and molar portions of the bone.

Fig. 2a.



Skull of *Trichys lipura*, natural size.

The animal described is undoubtedly the same as that of which a fragmentary skull has been figured by M. Gervais, Voy. Bonite, Mamm. pl. 11. figs. 4–6. The author thought it to be identical with *Hystrix macrura* (Gm.). As far as I can make out from his description, his materials were:—

1. A dried example, said to have been brought by the naturalists of 'La Bonite' from Sumatra*, where it is called "Landa Kloele." *This specimen is also tailless*; but M. Gervais adds that he had convinced himself, "qu'il avait été mutilé, lors de la préparation." No mutilation of any kind has taken place in our Bornean specimen brought by Mr. Low, who, besides, assures me that the natives had told him that this species was tailless.

2. The fragmentary skull taken from that skin, figured by M. Gervais, about the identity of which with that of our animal there cannot be any doubt.

3. But, singularly, M. Gervais refers further to this species the skeleton of a long-tailed Porcupine with twenty-one caudal vertebræ†,

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[*] According to Eydoux's Itinerary, the expedition did not touch at Sumatra (Voy. Bonite, Zool. i. p. xiii.).

[†] The numbers of vertebræ are differently given on p. 63; but "*Acanthion macrourum*" is probably a slip of the pen.

brought to the Paris Museum by Diard and Duvaucel (p. 62). With the evidence of two tailless specimens before us, we may well be justified in supposing that this skeleton does not belong to the same species of which he has figured the skull.

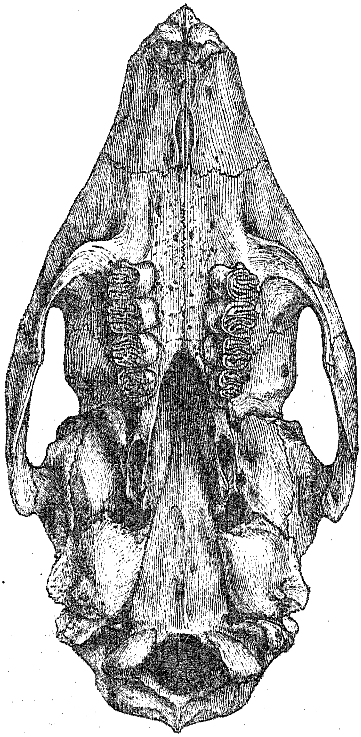
3. *On the Cranial Differences of the species of* Atherura.

Of the three species of *Atherura*, viz. :—

1. *A. fasciculata* (Waterh., ? Shaw), from Siam, with simple, flattened caudal bristles;

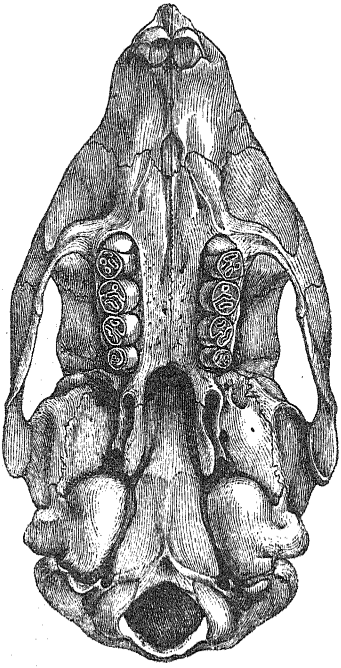
2. *A. macrura* (L., Waterh.)=*fasciculata* (Gray, Cantor), from the Malayan Province, with twisted and irregularly dilated caudal bristles; and

Fig. 3.



Atherura macrura.

Fig. 4.



Atherura africana.

3. *A. africana* (Gray), from the west coast of Africa, with caudal bristles as in the preceding*,—

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* I have repeatedly (for instance, P. Z. S. 1867, p. 103) drawn attention to

I know the two latter only. Although readily distinguished in the adult state, they are sufficiently similar when young to render the determination of examples, the origin of which is unknown, a matter of some uncertainty. The skulls, however, show constant, though slight, distinctive characters.

In *Atherura macrura* (fig. 3, p. 742) the foramina incisiva are extremely narrow slits which run in an almost parallel direction, and are very close together. The palatal notch advances far forwards, to the level of the third molar. The alisphenoid is very thin, but slightly bent outwards.

In *Atherura africana* (fig. 4, p. 742) the incisive foramina are narrow, but conspicuously wider and much more distant than in the Malayan species, and divergent behind. The roof of the palate extends far backwards, its hind margin being behind the level of the last molar. The alisphenoid forms a broad and rather thickened ramus, bent outwards and much produced backwards.

4. *On some new Mammals from Tropical America.*

Hapale leucopus. (Plate LXXII.)

Upper and lateral parts of the body covered with silky hair of moderate length and brownish-grey colour, darkest on the nape of the neck and occiput; face and head with short sparse white hair. Ears large, naked, without tuft. Throat greyish brown; lower parts of the body and inside of the legs rusty red; forearm, hands, and feet white. Tail short-haired, blackish or black, with white extremity.

The female differs from the male in the hairs of the upper parts having silvery white tips.

Length of head and body 11½ in., of tail 14½ in.

Number of vertebræ: cervical 7, dorsal 12, lumbar 7, sacral 3, caudal 31–33.

Medellin. Several specimens, identical in coloration, collected by Mr. T. K. Salmon near Medellin, Antioquia, U. S. of Columbia.

Dactylomys typus (Is. Geoffr.).

We have received two fine skins of this rare Rodent, unfortunately without skulls, from the Rio Napo.

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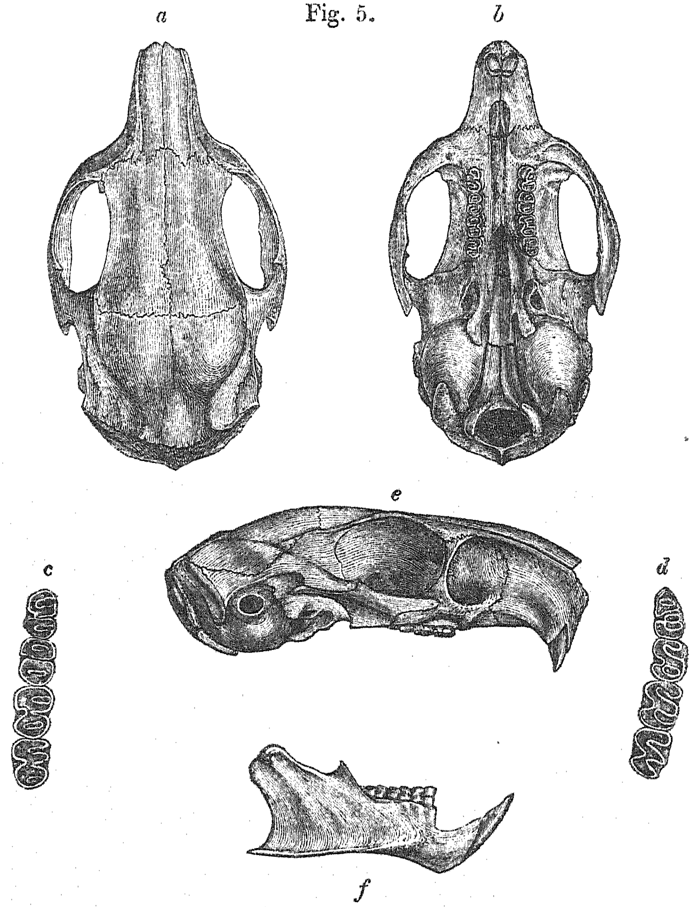
the occurrence on the coast of West Africa of freshwater fishes previously considered to be exclusively typical of the Indian region.

That these instances escaped the notice of naturalists who have recently discussed the relations of the African and Indian faunas is to me less surprising than the omission of a not less singular fact, viz. the reappearance of *Atherura* on the West-African coast. It strongly confirms Mr. Wallace's view that there is present, in the Mammals and Birds of West Africa, a special Oriental or even Malayan element (Geogr. Distrib. i. p. 263). Instances of this kind appear to me to be of infinitely greater weight in solving the problem of the mode of dispersion of animals over the globe (or their genesis) than deductions drawn from lists of genera vaguely or artificially defined. On this occasion I may also be allowed to refer to, and thus, perhaps, save from oblivion, some remarks in Rept. Brit. Ind. Introduct. p. viii, in which, I believe, for the first time, the occurrence of African Reptilian types in the Indian Region has been distinctly stated.

Lasiuromys villosus (Dev.).

A single specimen was in the collection made by Mr. E. Bartlett on the Huallaga river, and is preserved in spirits. It is an adult female. Being almost destitute of hairs about the head, and the skin of this part being so much injured that nothing could be ascertained about its external appearance, the skull has been removed. The tail had been mutilated during the lifetime of the specimen. The trunk and limbs are in good condition.

Fig. 5.



Skull of *Lasiuromys villosus.*
c, upper molars; *d*, lower molars: magnified.

The fur consists of uniformly soft, dense, almost woolly hair of moderate length. Tail densely hairy, the hairs being as dense and long as those on the back. Colour uniform bright brownish yellow somewhat less bright towards the head, and becoming darker towards the middle of the tail. The mutilated tail measures four inches, and appears to have been twice that length when perfect. The ears seem to have been small; claws of proportionate strength.

	in.	lin.
Length of trunk (without head)	7	6
Length of sole of fore foot (with claws)	1	0
Length of hind foot	1	10
Length of third and fourth toes	0	7

The facial portion of the *skull* (fig. 5, p. 744) is very short, the distance between the incisors and first molar being equal to the length of the molar series. The molar series diverge very slightly in front. Molar teeth distinctly longer than wide, with internal enamel-fold deeply penetrating the tooth and sometimes crossing it without interruption. The palatal notch advances to the level of the middle of the third molar. Vertical occipital crest developed.

	millim.
Length of the entire skull	57
Length of nasal bones	15
Length of frontal suture	22
Least width of the frontals	15
Distance between the incisor and first molar	12
Length of upper molar series	12
Width of palate between the second molars	3
Length of first upper molar	3
Length of second upper molar	3
Length of third upper molar	3½
Length of fourth upper molar	2½
Length of lower molar series	13

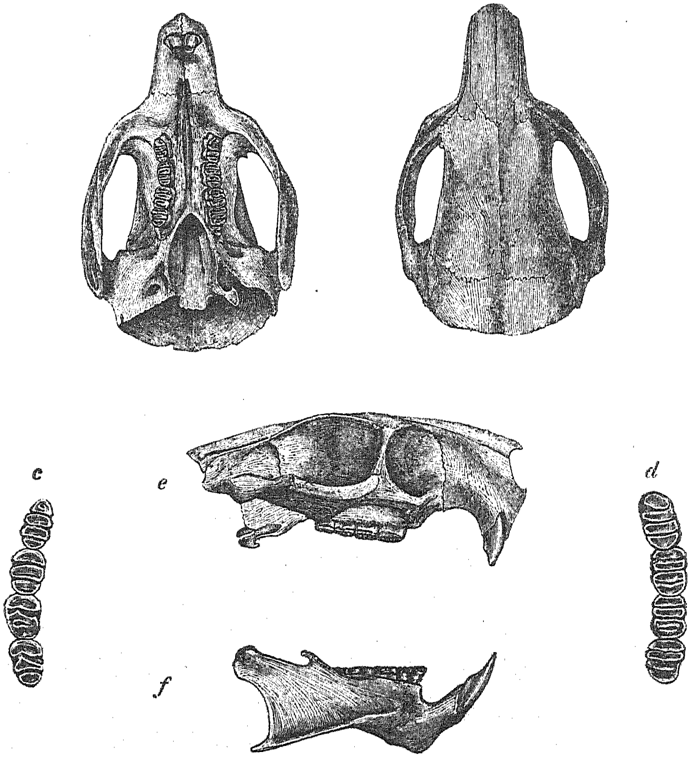
LONCHERES CANICEPS. (Plate LXXIII.)

Fur of uniform softness, without any spines. Tail rather densely covered with short hairs, below which the scales are more or less visible; towards the end of the tail the hairs are thicker, entirely hiding the scales. Upper parts rusty brown, with an admixture of some black hairs. Head to behind the eyes grey. Lower parts reddish white. Feet greyish, toes whitish. Tail black.

	in.	lin.
Length of head and body	11	0
,, tail	7	6
Distance between nose and eye	1	0
Length of fore foot	1	0
,, hind foot	1	10

This species belongs to the group with short snout, the distance between incisors and molars being considerably less than the length of the molar series. The molar series diverge in front as well as behind in both jaws. The single molar teeth are long, especially the first. The enamel-folds traverse generally the entire width of the teeth.

Fig. 6.



Skull of *Loncheres caniceps*.
c, lower molors; *d*, upper molars: twice nat. size.

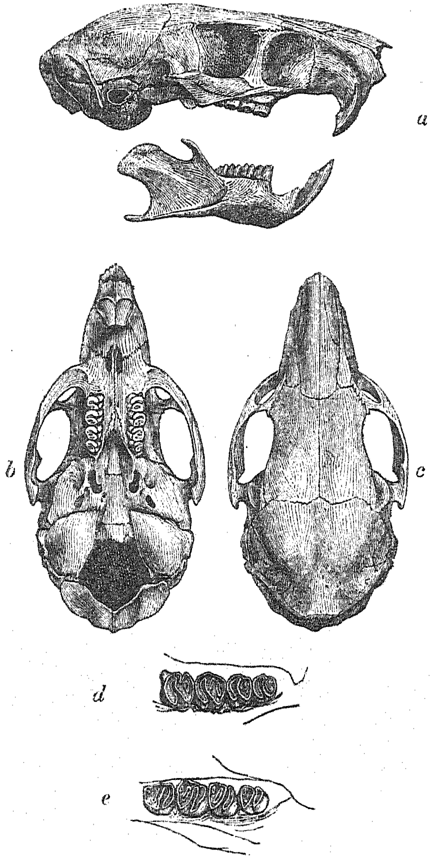
	millim.
Length of nasal bones	18
,, frontal suture	20
Distance between upper incisor and first molar	10
Length of upper molar series	13½
Width of palate between first molars	3½
,, ,, second molars	3
,, ,, fourth molar	5½
Length of first upper molar	4
,, second molar	3½
,, third, as well as fourth molar	3
,, first lower molar	4
,, second, third, or fourth molar	3½

Skin of an adult male from Medellin, collected by Mr. T. K. Salmon.

ECHIMYS DIMIDIATUS.

Fur composed of hairs only, somewhat harsh to the touch, and of moderate length. Tail nearly naked, covered with very small scales, pencilled at its extremity. Upper and lateral parts uniform brown,

Fig. 7.



Skull of *Echimys dimidiatus*.
d, upper molars; *e*, lower molars: twice nat. size.

lower parts of a pure white; the two colours sharply defined. The white colour extends in a narrow stripe round the upper lip, and occupies also the lower half of the tail. Feet brownish grey, toes whitish. Ears of moderate size. Claws feeble. Tail not much shorter than the body.

	in.	lin.
Length of head and body	7	6
,, tail	6	6
,, hind foot	1	9

The palatal notch extends far forwards, nearly to the level of the front margin of the third molar.

	millim.
Total length of skull	47
Length of nasal bones	17
,, frontal suture	14
Least width of frontals	11
Distance between incisor and first molar	9
Length of upper molar series	8
,, lower molar series	8

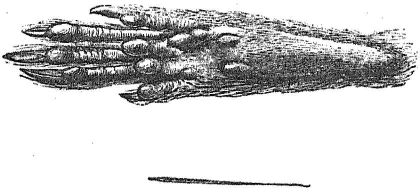
A fully adult male (stuffed) has been in the Museum for many years; nothing is known of its history beyond that it was presented by the Earl of Derby.

ECHIMYS BREVICAUDA.

Echimys brachyurus, Waterh. Mamm. ii. p. 345 (not synon.).

Fur composed of rigid hairs of moderate length, which, although flattened and channelled, are so narrow and flexible as not to merit the term of spines. Tail scaly, with scattered hairs. Upper parts brownish red, the hairs having black tips; sides similarly coloured, but of a lighter shade; throat and sides of the abdomen reddish white, middle of the abdomen white. Feet and tail greyish. Thumb scarcely detached, but distinctly clawed; the third and fourth fingers project about two lines beyond the second. The three middle toes are armed with rather strong claws and of nearly the same length. Ears of moderate size. Tail much shorter than the body.

Fig. 8.

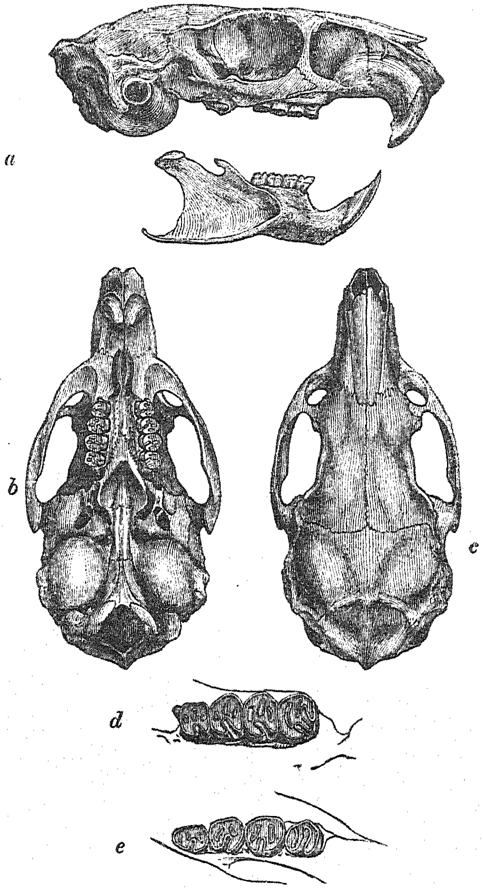


Foot and spine of *Echimys brevicauda*.

	in.	lin.
Length of head and body	9	0
,, tail	5	11

	in.	lin.
Distance between nose and eye	0	11
Length of fore foot	0	10½
„ hind foot	1	11

Fig. 9.



Skull of *Echimys brevicauda*.
d, upper molars; *e*, lower molars: twice nat. size.

The *skull* and *dentition* appear to differ scarcely from those of *Cercomys cunicularius* and *Echimys cayennensis*. The palatal notch is on a level with the hind margin of the last molar.

	millim.
Total length of skull	56
Length of nasal bones	20
,, frontal suture	16
Distance between incisor and first molar	12
Length of upper molar series	9
,, lower molar series	9

An adult male in spirits and the skin of an adult female were brought by Mr. E. Bartlett from Chamicuros, Huallaga river.

I believe that the specimen in the British Museum from Bolivia, noticed by Mr. Waterhouse as *E. inermis* (Mamm. ii. p. 498, pl. 16. fig. 5), is not specifically distinct from the Huallaga specimen. Its fur is somewhat less harsh than that of the latter, and its throat is white; but the skulls of both examples are entirely alike. Unfortunately the tail is lost. The true *Echimys inermis* of Pictet has a considerably longer tail than *E. brevicauda*.

Nor can there be any doubt that the two specimens from Chinore, which Mr. Waterhouse determined as *E. brachyurus*, are only the young of the same species. I removed the skull from the larger individual, and found only three molars developed. These examples, as well as the one named "*E. inermis*," are from the same collection, made by Mr. Bridges in Bolivia.

Echimys semispinosus (Tomes) differs in having the spines more strongly developed, and in its coloration.

ECHIMYS FERRUGINEUS. (Plate LXXIV.)

This species is allied to those which have been described under the names of *hispidus*, *spinosus*, and *brachyurus*, but is distinguished from the first by its shorter tail, from *E. spinosus* (Licht.) or *brachyurus* (Wagn.) by its shorter hind foot, and from *E. spinosus* of Rengger by a longer tail.

The whole of the upper and lateral parts is covered with spines, which are strong and broad on the middle and posterior parts of the body, becoming weaker towards the head and limbs, only the foremost part of the nose and cheeks being covered with hairs. Tail covered by large scales, with intermixed longish hairs sparse on the proximal half, but more dense towards its extremity, which terminates in a single very long fine hair. Upper parts and sides of a bright rusty red, shaded with greyish along the middle of the head and back and on the sides of the neck, each bristle having a greyish ring near the point, which is red. All the lower parts and limbs salmon-coloured. Lower lip and toes whitish. Tail grey. Ears of moderate size; claws of proportionate strength.

	in.	lin.
Length of head and body	6	3
,, tail	4	0
,, hind foot	1	3
,, longest bristle		11
Width of longest bristle		$0\frac{3}{4}$

The palatal notch extends forwards to the level of the middle of the third molar.

	millim.
Total length of skull	44
Length of nasal bones	13
,, frontal suture	14½
Least width of frontals	11
Distance between incisor and first molar	8½
Length of upper molar series	8
,, lower molar series	8

The skin of a fully adult male was obtained by Mr. E. Bartlett at Chamicuros, Huallaga River.

November 21, 1876.

Prof. W. H. Flower, V.P., F.R.S., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of October 1876.

The total number of registered additions to the Society's Menagerie during the month of October was 91, of which 52 were acquired by presentation, 18 by purchase, 2 by exchange, 2 were bred in the Gardens, and 17 were received on deposit. The total number of departures during the same period, by death and removals was 155.

Mr. Sclater exhibited the skin of a young Rhinoceros belonging to Mr. W. Jamrach.

The animal had been captured in the Sunderbunds, near the Ray Mangal river, in May last, and brought immediately to Calcutta, where it only lived 24 hours. Mr. Sclater called attention to the folds in the skin, which were exactly those of *Rh. sondaicus*, though it remained to be proved whether the Rhinoceros of the Sunderbunds was really identical with the Malaccan and Javan forms. According to Mr. Jamrach's information, the females of the species obtained in the Sunderbunds were entirely destitute of any horn*, which would appear not to be the case in the Javan animal. Mr. Sclater believed that this was the first specimen of the Rhinoceros of the Sunderbunds that had been brought to this country.

The Secretary exhibited, on the part of Mr. A. Anderson, F.Z.S., a coloured drawing of *Emys hamiltonii*, taken from life, from a specimen that was captured at Futtehgurh (Ganges) in April last. The occurrence of this, our handsomest emydine in India, a species chiefly confined to Lower Bengal, so far west as Futtehgurh (some 700 miles) was stated by Mr. Anderson to be of great interest. It proved, on dissection, to be a female, and measured across the carapace 10×9·6 inches.

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* The *Rhinoceros inermis* of Lesson (Compl. aux œuvres de Buff. ed. 2, vol. i. p. 514) appears to have been based on such a female.—P. L. S.

A letter was read from Count T. Salvadori, C.M.Z.S., containing the following remarks on some of the birds mentioned by Signor D'Albertis as seen by him during his first excursion up the Fly River (P. Z. S. 1876, p. 414; Ibis, 1876, pp. 359–362).

"Signor D'Albertis has not sent any specimens from the Fly River of the following species:—*Paradisea raggiana*, *Tadorna* sp., *Manucodia viridis*, *Epimachus magnificus*, *Microglossus aterrimus*, and *Ceyx solitaria*; so that these species are not included in my Catalogue of D'Albertis's second collection"*.

As regards the *Paradisea raggiana*, although Signor D'Albertis must be the one who best knows this bird, the most splendid of his discoveries, still as he does not state that he has killed any specimen of it along the Fly River, I should like to compare specimens of this locality with those of Hall Bay. I must say that I was rather inclined to think that the Bird of Paradise from the Fly River might be of a different species, as is the case with the *Goura* which I have lately described as *G. sclateri*, and which is certainly different from *G. albertisi*. The *G. sclateri* has been mentioned by Signor D'Albertis as *Goura*, sp. inc. (P. Z. S. 1876, p. 414), and again with only the generic name of Crowned Pigeon (*Goura*) in 'The Ibis.' I cannot help thinking that *Manucodia viridis* has been mistaken for the widely spread species *M. atra*, which is also found at Hall Bay and on the Aru Islands; while *M. viridis*, so far as I know, has a very limited range, and has only been found on the north-west peninsula. It would also be interesting to examine specimens of the *Epimachus* called *magnificus*, as it may happen that the bird from the Fly River belongs to the Cape-York form (*E. alberti*).

Signor D'Albertis has sent specimens of the birds named by him *Tanysiptera dea* and *Halcyon nigrocyanea*; and these are respectively *Tanysiptera galatea*, var. *minor*, and *Cyanalcyon stictolæma* of my catalogue. *C. stictolæma* is a beautiful species, allied to *C. nigrocyanea*, but certainly different.

The following papers were read:—

1. Descriptions of six new Species of Shells from the Collections of the Marchioness Paulucci and Dr. Prevost. By G. B. Sowerby, jun.

[Received October 27, 1876.]

(Plate LXXV.)

Conus pauluccIæ, sp. nov. (Plate LXXV. fig. 3.)

C. *testa elongata, solidula, obsolete striata, obtusissime angulata, antice attenuata, albida aurantiaco late interruptim fasciata,*

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* "Catalogo di una seconda collezione di uccelli raccolti dal Sig. L. M. D'Albertis nell' isola Yule e sulla vicina costa della Nuova Guinea e di una piccola collezione della regione bagnata dal fiume Fly," Ann. Mus. Civ. di Storia Nat. di Genova, ix. pp. 7–49, Ottobre 1876.

fasciis castaneo-fusco longitudinaliter strigatis, aliter lineis aurantiacis eximie trigono-reticulata; spira pyramidali, anfractibus leviter spiraliter sulcatis; apertura angusta, alba.

Long. 60, lat. maj. 20 mill.; spira alt. 19 mill., apertura lat. maj. 5, min. 2 mill.

Hab. Mauritius.

Shell elongated, rather solid, obsoletely striated, very obtusely angulated behind, and gracefully attenuated to the front, whitish, with broad interrupted bands of orange, longitudinally streaked with chestnut-brown, intersected by an exquisite network composed of triangular orange lines; spire pyramidal, whorls faintly spirally grooved; aperture narrow, white.

This beautiful species, belonging to the interesting collection of the Marchioness Paulucci, of Florence, forms a striking addition to the subgenus *Cylinder*, or "*textile*" group of Cones. In general form it resembles *C. gloria-maris*; but it differs from that valuable species in the formation of the spire, the whorls being much less concave and the angle of the body-whorl more rounded. In colour and marking it closely resembles *C. aureus*; but it is of a much more tapering form than that species, and its surface is much smoother.

CONUS SUPERSCRIPTUS, sp. nov. (Plate LXXV. fig. 4.)

C. *testa oblonga, solidiuscula, angulata, turgidula, lævi, antice valide sulcata, albida cæruleo tincta, maculis grandibus fulvis irregulariter ornata, fasciis frequentibus angustis maculatis et quasi literatis cincta; spira abbreviata, fulvo strigata, anfractibus concaviusculis, spiraliter sulcatis; apice acuto, roseo; apertura subangusta, fauce purpureo-fusco tincta.*

Long. 27, lat. 14 mill., apert. lat. maj. 4, min. 2 mill.

Hab. Madagascar.

Shell oblong, rather solid, angular, somewhat swollen, smooth, strongly grooved in front, whitish tinged with blue, irregularly ornamented with large yellowish blotches, and encircled with numerous narrow bands composed of letter-like spots; spire short, marked with radiating stripes of the same tawny colour as the spots on the body-whorl, whorls rather concave, spirally grooved; apex acute, rose-coloured; aperture rather narrow, interior tinged with purplish brown. This shell also belongs to the Marchioness Paulucci, and is the only specimen I have seen. Though of simple form, it is quite distinct from any hitherto known species. Its bluish tinge of colour and delicate letter-like markings are remarkable.

CONUS BACCATUS, sp. nov. (Plate LXXV. fig. 5.)

C. *testa abbreviato-turbinata, turgidula, minutissime decussata, conspicue seriatim granulata, albida, maculis aurantiacis grandibus trifasciata; spira acuta, brevi; anfractibus concavis, fere lævibus, ultimo biangulato.*

Long. 23, lat. maj. 15 mill.

Shell short, rather swollen, very minutely decussated, with regular rows of conspicuous granules, whitish, with large orange blotches arranged in three bands; spire acute, short, whorls concave, nearly smooth, last whorl biangulated.

This interesting little Cone belongs to the rich collection of Dr. Prevost, of Alençon. Apart from its somewhat stunted form, the delicacy of its markings and rows of gem-like granules, it is remarkable for the double angle at the top of the body-whorl.

CONUS REFLECTUS, sp. nov. (Plate LXXV. fig. 6.)

C. *testa pyriformi, antice granulata, postice lævi, ad angulum minutissime coronata, albida, roseo late bifasciata, fasciis fusco nebulatis; spira modica, anfractibus concaviusculis crebre sulcatis; apice acuminato.*

Long. 25, lat. 15 mill.

Shell pear-shaped, anterior portion granulated, otherwise smooth, very minutely coronated at the angle, whitish, with two broad bands of rose-colour clouded with brown; spire moderate, whorls rather concave, closely grooved; apex acuminated. Specimen in the collection of Dr. Prevost.

LIMA ZEALANDICA, sp. nov. (Plate LXXV. fig. 1 *a*, fig. 1 *b*.)

L. *testa lata, crassa, subinflata, radiatim costata, utrinque paululum hiante; latere antico oblique producto, late concavoplanulato, infra medium angulato, margine ventrali ad angulum acclivi; latere postico oblique rotundato; costis* 18, *regularibus, quadratim rotundatis, crassis, squamatis, interdum fulvorubescentibus; interstitiis lævibus, concavis, costas æquantibus; auriculis parvis declivibus; umbonibus acutis incurvatis.*

Shell broad, thick, rather inflated, radiately ribbed, slightly gaping on each side; front side obliquely produced and concavely flattened, forming an oblong lunule terminating below the middle in a decided angle; the other side obliquely rounded; ribs eighteen in number, rather square, thick, scaled, sometimes of a reddish-brown colour; interstices between the ribs smooth, concave, equal in width to the ribs; auricles small, sloping; umbones acute, incurved.

Hab. New Zealand.

This species is well distinguished from its congeners by a broad concave lunule, forming a straight outline to one side of the shell, terminating in an abrupt angle. Among recent species its nearest analogues are *L. paucicostata* (Sowerby) from the Red Sea, and *L. multicostata* (Sowerby) from Australia; but it differs from both these in the characters above mentioned, and in the number of ribs being more than those of the former and less than those of the latter; the ribs also are more elevated than either. There is a fossil species found in the Pliocene of New Zealand to which this is more nearly allied; but, upon comparison, I am convinced that it is distinct. All the species of *Lima* hitherto known being entirely white (with the exception of *L. fasciata*, which has very faint fulvous concentric bands), receiving first the coloured specimen of the new species I thought the colour might prove specific; but I have since received a larger specimen in which there is no trace of colour; so that the coloured specimen must be regarded as a variety. Both specimens belong to the collection of Dr. Prevost.

Cardium ornatum, sp. nov. (Plate LXXV. fig. 2.)

C. *testa oblique orbiculari, mediocriter inflata, radiatim costata, latere antico rotundato, postico superne leviter compresso, obtusissime angulato; costis* 28, *elevatis, angulatis, conspicue nodosis, maculis rubris paucis pulcherrime ornatis, ad latera oblique sulcatis.*

Long. 19, lat. 17 mill.

Hab. Hongkong.

Shell obliquely orbicular, moderately inflated, radiately ribbed, front side rounded, posterior slightly compressed, and very obtusely angled at the upper part; ribs twenty-eight in number, elevated, angulated, conspicuously noduled, and ornamented with distant red spots; sides of the ribs obliquely grooved.

Several specimens of this pretty little species were sent me last year from Hongkong by Mr. Cuthill, the type having passed into the collection of Dr. Prevost.

EXPLANATION OF PLATE LXXV.

Fig. 1 *a* and *b*. *Lima zealandica* and var., p. 754.
2. *Cardium ornatum*, p. 755.
3. *Conus paulucciæ*, p. 752.
4. —— *superscriptus*, p. 753.
5. —— *baccatus*, p. 753.
6. —— *reflectus*, p. 754.

2. On two new Species of *Hesperomys*.

By Edward R. Alston, F.L.S., F.Z.S., &c.

[Received November 1, 1876.]

In examining the Central-American specimens of Muridæ in the British Museum I have found two well-marked species which appear to be undescribed.

Of these, the first was indicated, though not characterized, by the late Dr. Gray, and was exhibited to this Society, along with some other Guatemalan mammals, in June 1843. I have thought it best to retain his name, and would therefore call it:—

Hesperomys teguina, sp. n.

Mus teguina, Gray, P. Z. S. 1843, p. 79 (sine descr.).

Ears moderate, rounded, sparingly clad with fine blackish hairs. Tail short, not longer than the body alone, very minutely annulated and rather thickly covered with fine short dark-brown hairs. Fur close and velvety. Colour of all the upper parts warm dark reddish brown, the fur lead-coloured, with red-brown tips, the longer hairs on the back black; chin, throat, and breast like the upper parts, but more greyish, the rufous tips of the hairs being shorter; belly shaded into deep fawn; ears, feet, and tail dusky. Approximate measurements of the mounted type specimen:—

	inches.
Length of head and body.........	3·25
,, tail (tip imperfect).....	1·90
,, ear..................	0·40
,, hind foot..............	0·65

Hab. Coban, Guatemala (*Brit. Mus.*).

This very peculiar small dark short-tailed mouse is quite unlike any other species with which I am acquainted. It may here be observed that the *Mus tazamaca*, indicated as new by Gray at the same time, proves to be the species since named *Reithrodon mexicana* by M. de Saussure*.

The second species is a large form, which I propose to name after Dr. Elliott Coues, whose recent researches have done so much towards clearing up the confusion existing as to North-American rodents.

HESPEROMYS COUESI, sp. n.

Ears proportionally small, rounded, sparingly clothed with short hairs. Fore feet small; hind feet large, the toes long, the second, third, and fourth being subequal, the soles quite naked, with small tubercles arranged as in *H. palustris.* Tail long, scaly, almost naked, the fine sparse hairs being hardly perceptible. Fur thick and rather woolly. Upper parts reddish brown, the fur dark slate-colour, with broad rufous tips, mixed with longer black hairs; the flanks lighter rufous, gradually shading below into dirty white (or pale fawn) without any distinct line of demarcation; breast washed with rufous; feet very sparsely clad with short greyish hairs; tail nearly unicolorous, paler beneath at the base. Teeth typically Hesperomine; skull with the upper margin of the orbits forming a raised crest (as in *H. palustris*), but the palate not produced so far back. Measurements of three specimens, *a* in spirits, *b* in skin, *c* mounted:—

	a. inches.	*b.* inches.	*c.* inches.
Length of head and body....	5	6·75	—
,, tail............	5·70	6·00	5·40
,, ear............	0·54	0·55	
,, fore foot........	0·48	0·55	
,, hind foot........	1·10	1·30	1·08
,, skull............	..	1·25	

Hab. "Mexico," (*b*) *Geale*, (*c*) *Verreaux*, Brit. Mus.; Guatemala (*c*); Coban, (*a*) *Salvin*, Brit. Mus.

The Guatemalan specimen differs from the Mexican ones in being light fawn beneath, instead of dirty white more or less washed with rufous, but agrees in all other respects.

This species resembles *H. palustris*, Harl., in the raised supraorbital ridges of its skull, its short ears, large hind feet, and naked soles—points which have caused Drs. Baird* and Coues† to separate that species as a subgenus *Oryzomys*. It differs strikingly, however, not only in size and coloration, but in the long and nearly naked tail. In the latter it rather agrees with the forms named *H.* (*Tylomys*) *nudicaudus* by Dr. Peters‡ and *Neomys panamensis* by Gray§; but these have a different type of skull, the supraorbital edges being produced laterally instead of vertically. From the character of the feet, I should expect that *H. couesi* would prove to be at least partially aquatic in its habits.

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* Rev. et Mag. de Zool. 1860, p. 109.

3. On the Chinese Deer named *Lophotragus michianus* by Mr. Swinhoe. By A. H. Garrod, M.A., F.R.S., Prosector to the Society.

[Received November 7, 1876.]

(Plate LXXVI.)

At a meeting of this Society in 1874 (P. Z. S. 1874, p. 453), Mr. R. Swinhoe described a small Deer sent him from the neighbourhood of Ningpo by Mr. Michie, of Shanghai, and gave it the name *Lophotragus michianus*, after its discoverer. The specimen consisted of a skin, without the skull or any other bones. Mr. Sclater, at the time, suggested that it might be the *Elaphodus cephalophus*, which had been described shortly before‖ by M. Alphonse Milne-Edwards from specimens obtained by Père David in Moupin. Mr. Michie informed Mr. Swinhoe that the specimen was a female; and Dr. Peters, of Berlin, who carefully examined it before it was mounted for the national collection in that city, has courteously answered questions which I put to him with reference to it (the type) in the following words:—"It does not show a trace of horns. . . . It shows *well-developed* teats, and not a trace of a penis; there is no trace of an impression on the lower lip, as would have been the case if it had been furnished with the male tusks, figured from imagination in Swinhoe's figure." From what will be said further on it can be evidently inferred that the type specimen is a female.

A second specimen, a living male, of the same Deer was purchased by the Society on February 12th last from Mr. Michie's agent. It also came from the Ningpo district. Mr. Sclater's note with reference to it, together with a woodcut of the animal, will be found in the 'Proceedings' for this year (*anteà*, p. 273). In this he tells us that "the canines project from the sides of the mouth, as in *Hydropotes*. There are no external antlers; but there are hard projecting cores, sensible to the touch, beneath the elongated hairs which form a flattened disk on the forehead."

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* Mamm. N. Amer. p. 458.

† Proc. Acad. Philad. 1874, p. 183

‡ Monatsb. Ak. Berlin, 1866, p. 404.

§ Ann. & Mag. Nat. Hist. 4th ser. xii. p. 417.

‖ Nouv. Arch. du Mus. 1874, Bull. p. 93.

Shortly after its arrival the animal began to show symptoms of paralysis, which led to its death on the 14th of July. The following are measurements made a few hours after its death, before any incisions had been made :—

	inches.
From tip of nose to base of tail	36
Fleshy tail	3
Length of head	9½
Length of ear	5½
Greatest breadth of ear	3½
From the middle line of the back straight down to the elbow	10
From the elbow to the wrist	5½
From the wrist to the base of hoofs	6½
From the middle line of back straight down to the knee	11¼
From the knee to the ankle	9
From the ankle to the base of the hoof	10

A minute examination of the skull and skin of this specimen, in association with the description and figures given of *Elaphodus cephalophus*, made it quite evident to me that Michie's Deer is of the same genus as it; and I wrote to M. Milne-Edwards to ask him some questions of detail with reference to the Moupin species. In reply that gentleman told me that, besides the specimen figured by him, he has two other skins of the same species in very bad condition, which much resemble *Lophotragus* in their colour, and that he believes they clearly show that the species is variable in its coloration, and that the Deer described by Mr. Swinhoe is the same as that obtained by Père David. At the same time he very courteously sent me the two skins above mentioned, from the larger (male) of which the figure of the skull given by him was taken, and also gave me permission to remove the skull from the smaller (young female) skin. This I have done, and find that in age it is exactly the same as the Society's specimen.

A comparison of the skins makes it immediately evident that the animals from Moupin and those from Ningpo scarcely differ from one another at all, and that *Lophotragus michianus* and *Elaphodus cephalophus* are the same species, slightly modified in accordance with the difference in their habitats.

The following description of the species may serve to render its characteristics more apparent :—

Elaphodus cephalophus is a Deer of about the same size as the Indian Muntjac (*Cervulus muntjac*), with minute simple antlers, which are situated on slender convergent pedestals; and with enormous canine teeth. The supraorbital glands, found in the Muntjacs, are not present; nor is there a tufted gland on the outside of the metatarsus.

The hair is coarse and slightly quill-like. In the Moupin specimens it is of two kinds as regards general coloration—all in front of a vertical line drawn through the shoulder-joint, with the exceptions to be mentioned below, being whitish at the base, and gradually becoming dark-brown towards the tip, quite close to which there is a distinctly marked narrow *white* ring. This white ring near the extremity of each hair gives a speckled appearance to the parts covered with it.

Over all the body behind the above-mentioned line this white ring is absent; and each hair, from being white at the root, gradually darkens to become of a rich brown at the tip, over the sides and back of the animal, more pronounced along the middle line—at the same time that, whilst deepening in intensity down the legs, below the carpus and tarsus the colour is almost black itself, as are the hoofs. In the female figured by M. Milne-Edwards, which is of a more rufous tint generally than the pair of skins lent by him to me, there is, as is sometimes the case in *Cervulus reevesi*, a white line just above the hoofs.

The under surface of the tail is white, as is also the hair in the pudendal region.

Much resembling, though more developed than in the females and the young males of the genus *Cervulus*, there is a crest of lengthy deep-brown, almost black hair arranged in a horse-shoe shape in the frontal region. It is anteriorly that the crest is deficient, the short speckled hair of the nose extending backwards, at the same time that it lengthens, to enter the interior of the enclosure thus formed. This crest is slightly prolonged between the ears as a pointed process, with the equally dark hair of the base of the exterior of which it does not blend, a narrow speckled isthmus intervening. M. Milne-Edwards tells us* that the interior of the ears is whitish, and that the tips of these organs, as well as the greater part of their inner edge, are of a nearly pure white. A transverse black bar extends across the inner surface of the ear, about three quarters of an inch broad. Along the lateral margin of the outside of the horse-shoe crest the short hair forms a light grey line in front of the eye, becoming reddish brown behind it. The long hair of the crest itself is directed backwards.

In the young male specimen from the hills near Ningpo which forms the subject of the present paper, the only hair which is ringed is situated in the front of the base of each ear, occupying an extremely small area. Elsewhere the chocolate-brown of the Moupin examples is replaced by greyish-black, each hair being white for a considerable distance from its base. The face and neck are therefore not speckled or brown, but uniformly dark grey. The head is figured, as it appeared immediately after death, in the accompanying drawing (Plate LXXVI.).

The *skull* of the Ningpo *Elaphodus* cannot be said to differ essentially from the Moupin specimens. Although there are exquisite figures in the 'Recherches pour servir à l'histoire Naturelle des Mammifères'† of the skull of the adult male, M. Milne-Edwards has most obligingly allowed me to remove the cranium from the skin of the female that he has lent me, which fortunately happens to be of exactly the same age as the Society's male; in other words, the median milk-incisors are gone, whilst the third molars are just protruding, all the milk-molars being in place. In the Society's specimen the frontal pedestals are fairly long, but without any antlers at their extremities. Their bases are slightly further from one another than in the Moupin male; and there is a second slight difference from both it and the female, which is, that just at the root of the ascending orbital process of the malar bone the ring of the orbit does not become ossified upwards so as to reduce its size by the formation of a shallow lamina above the masseteric ridge. This peculiarity may also be expressed by saying that the surface of origin of the masseter muscle extends upwards as far as the margin of the orbit in the Ningpo male, whilst in those from the more western locality it ceases some distance below it. But it must be noted that the Ningpo specimen died in very bad condition, the bones being spongy and ill-marked*, whilst the others were shot wild. In it, strangely enough, there is also an abnormality with which I am not at all acquainted. It is that the malar bones on both sides, instead of being single, are made up of two independent parts, an orbital and a zygomatic, with the suture longitudinal and nearly straight, extending from the anterior extremity of the zygomatic process of the temporal bone to the posterior inferior part of the large crumenal depression.

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* *Loc. cit.* p. 355.

† Atlas, pls. 66 & 67.

Sir Victor Brooke†, in his paper on the *Cervuli*, has drawn attention to the very peculiar distribution of the ankyloses in the tarsus of that family, he having demonstrated that in it the external and middle cuneiform bones blend with the naviculo-cuboid to form a single bone. The same condition exactly exists in *Elaphodus cephalophus*, the innermost cuneiform bone remaining free. But, strange to relate, in my specimen of Michie's Deer, on both sides, this internal cuneiform bone is completely anchylosed with the metatarsus, a further specialization than is found in any other ruminant, so far as I can make out.

In Michie's Deer no trace of the lateral metacarpal rudiments could be detected. It possesses thirteen pairs of ribs, six lumbar vertebræ, six ankylosed sacrals, and nine caudals, making forty-one

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* The following are the measurements of the skull of the Ningpo male, side by side with which those of the male (adult) Moupin specimen are given, from M. Milne-Edwards's figure:—

	Ningpo spec. in.	Moupin spec. in.
Extreme length of skull	$6\frac{3}{4}$	$7\frac{15}{16}$
Extreme breadth from zygoma to zygoma	$3\frac{1}{32}$	$3\frac{7}{16}$
Interval between inner sides of frontal pedestals	$1\frac{13}{32}$	$1\frac{1}{8}$
Extreme length of nasal bones	$2\frac{3}{16}$	$2\frac{1}{8}$
Breadth of facial plane opposite lacrymal foramina	$1\frac{21}{32}$	$2\frac{1}{32}$
Mandible from angle to incisor margin	$5\frac{1}{2}$	$6\frac{1}{2}$
Extreme length of præmaxilla	$1\frac{23}{32}$	$2\frac{5}{32}$
Extreme intermolar breadth	$1\frac{1}{4}$	

† P. Z. S. 1874, p. 33.

vertebræ in all. The bones, in the specimen under consideration, especially those of the limbs, are extremely porous and badly marked; nevertheless, on making a section of the head of the metatarsus, it is apparent that the internal tarsal cuneiform bone has so completely fused with it as to leave no line of demarcation. In the Paris specimens of *Elaphodus* the tarsus exactly resembles that of *Cervulus*, and the lateral metacarpals are very nearly lost.

In the young female from Moupin the milk canine teeth are in place, their permanent successors appearing, in the dry skull, above them. In the male of the same age from Ningpo, the tusks have a remarkably permanent appearance, and there is no evidence from the condition of the maxillary bones that they belong to the milk series. Such being the case, it must be presumed that the milk canines in the male are shed earlier than in the females, as it is not in accordance with any known facts that they should have persistent pulps which would remove any necessity for their replacement.

Anatomy of the Alimentary Canal and other Viscera.

The muffle is more considerable than in the Elaphine Deer, but resembles that of the *Rusinæ* and Muntjacs in extending upwards along the outer border of each nostril as far as its superior margin. The canine tusks protrude an inch below the upper lip, and mark the lower lip at the spots at which they come into contact with them.

The *palate* in front of the intermolar region is transversely ridged by folds of the mucous membrane, slightly crenulated at their free backwardly directed edges. These folds are deficient in the middle line; and those on one side are not continuous with those of the other, but with the spaces which intervene between them. The intermolar region and the palatal surface behind it are smooth, and black instead of flesh-coloured, as it is anteriorly.

The *tongue* is like that in most ruminating animals, broad near the tip, then narrower, and again slightly broader opposite the intermolar eminence. Its mucous membrane is covered with two kinds of papillæ—first the filiform, small, thick-set, short and blunt over the anterior part of the organ, conical and larger in the middle of the intermolar eminence, and secondly the fungiform, disk-shaped and flattened, scattered sparsely over the fore part, and at the sides of the intermolar eminence gradually enlarging and becoming arranged in a linear manner, converging as they run back to form the circumvallate papillæ, eleven on one side and twelve on the other.

The salivary glands present no special features of interest. The tonsils open each by an orifice situated in the middle of a slight depression. The epiglottis is rounded, with a slight notch in the middle line of its contour.

The *stomach* possesses much the proportions of that of the Musk (*Moschus moschiferus*)*. In the *rumen* perhaps the converging left lateral cæcal extensions of the upper and lower compartments are slightly longer. The villi are there very close-set, elongated, flattened, and slender, with nearly parallel sides, the largest being slightly spooned at their free ends. In most parts they are about a quarter of an inch long; but on the folds they are much shorter. Nowhere are they absent. They are all blunt-tipped and slightly crenulated along their margins. No trace of the special gland found by Prof. Flower on the anterior wall of the paunch of the Musk could be detected. Neither in *Cervulus muntjac* nor in *C. reevesi* are the villi of the rumen flattened, they being cylindrical. The cells of the *reticulum* are shallow and not large, covered with minute papillæ on their floors, and with a regularly arranged row on the top of each cell-wall.

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* *Vide* P. Z. S. 1875, p. 168.

The *psalterium* resembles that of the ordinary Deer, and differs from that of *Moschus* in that the plicæ are unequal in length. There are thirteen folds of what may be termed the first power, because they are the deepest, between each two of which one of the second power is developed. On each side of each secondary fold is a tertiary, about a quarter of an inch deep; and, again, there is a longitudinal row of papillæ on each side of each tertiary fold, which may be considered to be a rudimentary set of the fourth power. Such a psalterium may be called *quadruplicate*, because folds are present of four different depths. The stomach of *Moschus* would be simpliciplicate, were it not that there is a row of papillæ developed between the plicæ in some parts; it is therefore duplicate upon the nomenclature here suggested.

The *abomasum* presents no peculiarities.

The following are the measurements of the intestines:—

	ft.	in.
Small intestine	23	2
Large intestine	9	8
Cæcum		9¼

The colic coil was not disposed in quite the ordinary manner; but the peculiarity was probably an individual one. At its end the large intestine made a complete transverse reduplication before turning forward from the right iliac fossa to form its terminal and irregular curve round to the sigmoid flexure.

The *spleen* is flat on one side, domed on the other, and circular.

The *liver* is composed of two nearly equal lobes, from the abdominal surface of the right of which is developed the triangular and laterally directed caudal lobe. The Spigelian lobe is only rudimentary, being represented by a slight tumefaction of the vertebral border of the portal fissure. There is no gall-bladder.

In the arteries of the neck the arrangement is that found in the Ruminantia generally, the ascending aorta giving origin, first to the left brachial with the corresponding vertebral, then to the left carotid, and finally to the same three vessels of the right side.

There are thirty-eight tracheal rings above the accessory bronchus, and nine below it, making forty-seven in all. In the lungs the two lobes of the left side and the five on the right were found, the right lung being the larger. The lower lobe of each lung is comparatively small.

The *brain* (figs. 1 and 2) is richly convoluted for its size, its measurements, after having been hardened in spirit, being:—

	in.
Greatest length of hemispheres	$2\frac{19}{32}$
Greatest depth of hemispheres	$1\frac{1}{2}$
Greatest breadth of brain	$2\frac{3}{16}$

It is therefore somewhat larger than in *Cervus humilis*, as may be inferred from the measurements given by Professor Flower*. This species it also closely resembles in its convolutions, as well as in the considerable development of the anterior lobes. The hippocampal, inferior external, together with superior and middle external gyri, are easily recognizable, the sulcus separating the last two being long, and the middle external gyrus traversed in the direction of its length by

Fig. 1.

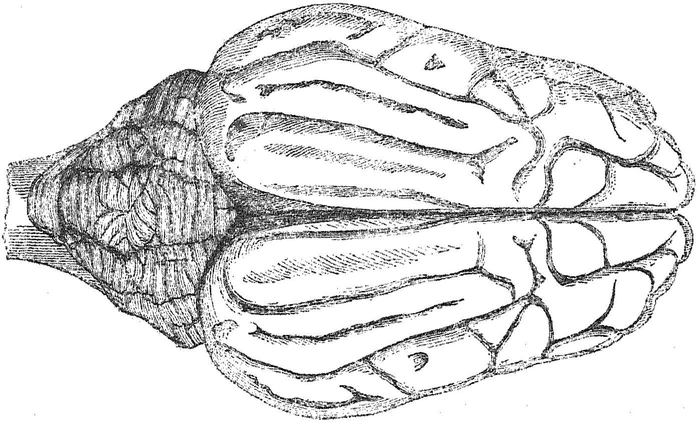
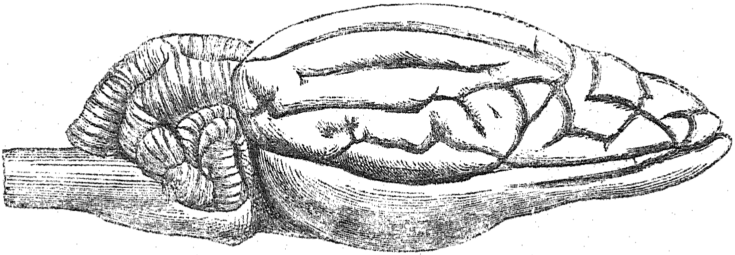


Fig. 2.



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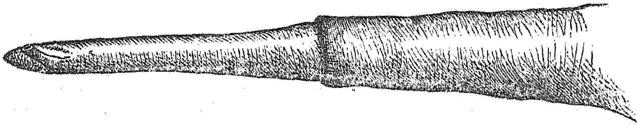
* P. Z. S. 1875, p. 176, note.

a minor sulcus. There is a break in the sulcus which separates the middle and inferior external gyri a little more than an inch from the anterior border of the hemisphere, which is peculiar. As in *Moschus* and in *Cervus humilis*, the calloso-marginal sulcus appears on the superior surface of the brain, allowing the hippocampal gyrus to appear between it and the middle line. In *Cervulus muntjac* the convolutions are slightly less developed than in Michie's Deer, and the calloso-marginal sulcus is even more superficial; it is, however, narrower anteriorly.

In its *generative organs*, the glans penis (fig. 3), instead of being blunt, is an elongated and slender cone, terminating much like the tip of a wooden pen-holder, the urethral orifice being situated just behind the extreme tip, slightly turned upwards. The Muntjacs and the Roe Deer agree with Michie's Deer in the shape of the glans; but whereas there is no trace of Cowper's glands in *Capreolus* and Michie's Deer, they are large in *Cervulus* (in *C. muntjac* at least). There are four nipples. On the outside of the skin covering the metatarsus I found in the recently dead animal a deep smegma-secreting depression, evidently homologous with the metatarsal glands in most Cervidæ. There were no tufts of hair round these; and I cannot recognize their situation in the prepared specimen of the skin.

Fig. 3.



General Remarks.

From what has been said above, it is evident that the *Lophotragus michianus* of Swinhoe is the same animal as the earlier-named *Elaphodus cephalophus* of A. Milne-Edwards, and that it was because his specimen was a female in which the skull was wanting, at the same time that the figure given by M. Milne-Edwards is from a remarkably light-coloured and red skin, that Mr. Swinhoe was misled as to its affinities. It seems, however, that the Ningpo animal is of a greyer tint than that from Moupin; for the description given by Mr. Michie[*], namely that "it is a dark iron-grey or pepper-and-salt colour, like some Scotch terriers," exactly applies to the Society's example, whilst the Paris skins are all decidedly chocolate, although differing in tint among themselves.

As to the affinities of *Elaphodus cephalophus*, M. Milne-Edwards[†] has remarked that "it is intermediate between the Muntjacs and the ordinary Deer, in certain respects appearing even to unite these animals to *Hydropotes* and *Moschus*."

That *Moschus* has any close affinities with *Cervulus* and its allies is extremely doubtful; and a comparison of the above description of the visceral anatomy of *Elaphodus* with the facts brought forward in Prof. Flower's important memoir on *Moschus* tends to confirm this view.

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[*] P. Z. S. 1874, p. 453.

[†] *Loc. cit.* p. 353.

The internal anatomy of *Hydropotes* is not known; but the absence of any frontal tuft, the presence of an inflated auditory bulla, together with the non-ankylosis of the cuneiform bones with the naviculo-cuboid of the tarsus, are against its Cervuline affinities.

With *Cervulus* there is every reason to believe that *Elaphodus* is most intimately related. The size of the animal, the conformation of the skull, the fusion of the cuneiform bones with the naviculo-cuboid, the non-development of the metatarsal tufts, and the presence of the frontal crest are all evidences in that direction, as is the similarity of the shape of the glans penis in the two genera. It appears to me that *Cervulus*, together with *Elaphodus*, form a subfamily of the Cervidæ, which might be termed the Cervulinæ and be defined as follows:—

CERVULINÆ. Small Cervidæ in which the proportionally small antlers are situated on elongated pedestals, up the front of which the lengthy hair of the crest which is developed in the frontal region extends. Females hornless. Suborbital glands large in both sexes. No metatarsal tufts. Canine tusks large in the males, minute in the females. The second and third cuneiform bones of the tarsus ankylosed with the naviculo-cuboid. The lateral metatarsals wanting, and the lateral metacarpals present only as slender bones opposite the upper ends of the third and fourth metacarpals, or wanting altogether.

Two genera are contained in this subfamily.

Cervulus. Cervulinæ in which the pedestals of the antlers are divergent, and send downwards from their roots strong supraorbital ridges, the antlers themselves diverging into a brow-antler and a simple beam. Cutaneous glands developed on the inner side of each supraorbital ridge.

Elaphodus. Cervulinæ in which the pedestals of the antlers are convergent and do not send downwards supraorbital ridges. Antlers minute and simple, scarcely projecting beyond the much-developed frontal hair-tuft. Frontal glands absent.

4. Descriptions of new Species of Lepidoptera from New Guinea, with notice of a new Genus. By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

[Received November 4, 1876.]

(Plate LXXVII.)

The following novelties formed part of a collection recently made in Yule Island, New Guinea, by Dr. James.

RHOPALOCERA.

NYMPHALIDÆ.

EUPLŒA GUERINII, Felder.

I merely record this butterfly as being common in the collection, and only previously known to occur at Aru; until now I had not seen the species.

EUPLŒA DOLOSA, n. sp. (Plate LXXVII. fig. 1.)

Allied to the preceding, smaller, no white spots.

Wings above dark pitchy brown, paler on the external area and costal area of secondaries; primaries with six to seven lilac subapical spots in a curved series, the third in the male (which is fourth in the female) largest and sagittate; male with an elongate interno-median sericeous streak; female with the subapical spots larger and paler than in the male. Wings below bronzy olive-brown; central area of primaries blackish, internal area greyish, with a sericeous streak in the male and a white streak in the female; a minute bluish dot in the cell and three beyond it (sometimes wanting): secondaries with a dot in the cell, and sometimes one beyond it pale bluish; base of wings and pectus black, white-spotted. Expanse of wings, ♂ 3 inches 1 line, ♀ 2 inches 9 lines.

CALLIPLŒA JAMESI, n. sp. (Plate LXXVII. fig. 2.)

Allied to *C. pumila*, but the male darker than *C. trimenii* or *C. seriata*.

♂. Wings above deep shining red-brown, the external half of primaries and the apical border of secondaries almost black, with faint purplish reflections; primaries with two subapical contiguous white spots, and below them a decreasing submarginal series of four white spots, all bordered with lavender; secondaries with costal area shining silver-grey, the cell and the area immediately above it occupied by a large creamy patch; a whitish subapical dot. Primaries below slightly paler; a large creamy internal patch reaching the median nervure; four pure white subapical spots in an oblique series, the two upper ones contiguous and largest; a submarginal series of minute white points: secondaries red-brown, apical area slightly darker; two subapical and four to five submarginal white points; base and pectus black, white-spotted. Expanse of wings 2 inches 8 lines.

♀. Paler and more uniformly coloured than the male, white spots much larger, bordered with lilac, subapical spot of primaries trifid, five submarginal spots; three subapical white dots in secondaries: wings below paler, all the spots of the upper surface, and a complete submarginal series of spots white: expanse of wings 2 inches 8 lines.

A well-marked species.

CALLIPLŒA INFANTILIS, n. sp. (Plate LXXVII. fig. 3.)

♂. Allied to the preceding species, considerably smaller, darker, with fewer spots.

Primaries above deep coppery brown, the costal and apical half of primaries and the submedian area of secondaries almost black, with very feeble bluish reflection; primaries with a large trifid subapical white spot, washed with lilac; two submarginal white spots immediately below it: secondaries with the costal area shining brownish grey; the upper half of the cell and the area immediately above it sordid whitish. Wings below more uniform in colour than above; primaries with the interno-median area whitish; five subapical spots in an oblique series, the third largest: secondaries with two subapical bluish dots, the lower one barely visible; base of wings and pectus black, white-spotted. Expanse of wings 2 inches 2 lines.

The smallest species hitherto described.

TENARIS JAMESI, n. sp. (Plate LXXVII. fig. 4.)

Wings semihyaline, snow-white, with a diffused basal ochraceous nebula; primaries with the costal area and apex black-brown, external angle irrorated with sooty brown: secondaries with the apex and apical border sooty brown; a large subapical ocellus visible from transparency of the wing; a large ocellus on the first median interspace black, with white-dotted lilac pupil and diffused yellowish iris with greyish edge (round which is seen a pale ochraceous zone, owing to the transparency of the wing): head and collar black; antennæ black, palpi orange with black tip, thorax grey, the prothorax brownish; abdomen ochreous. Primaries below nearly as above, but without the sooty external angle; secondaries without the sooty apex and border, with two large ocelli, one subapical the other as above, black irrorated with blue scales, with large white pupils and broad grey-bordered ochreous irides. Pectus and legs black. Expanse of wings 4 inches 3 lines.

Allied to *T. mylœcha*.

ATELLA CERVINA, n. sp. (Plate LXXVII. fig. 5.)

Above reddish tawny, paler in the female, with blackish markings as in *A. arruana*, but more pronounced; wings below also much as in *A. arruana*, but the basal area not washed with lilac in either sex, the black spots more pronounced, the whitish discal and submarginal spots more silvery, and the submarginal zigzag ochreous band much more irregular: expanse of wings, ♂ and ♀, 2 inches 5 lines.

Though nearly allied to *T. arruana*, this species is much larger, darker, more heavily bordered and spotted with black-brown, and the basal area below differs markedly in the absence of the strong lilac wash which is persistent in the Aru species.

HETEROCERA.

CELERENA, Walker*.

Allied to *Celerena* (of Lepidoptera Heterocera); wings larger, more or less yellow in colour; the arrangement of nervures much the same; palpi thicker, antennæ much more slender. Type *C. divisa.*

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* Mr. Walker altered the type of his genus *Celerena*, originally described in the 'Transactions of the Entomological Society,' from *C. divisa* to *C. sobria*; as the two species are not congeneric, I would propose for the latter (which is the type of *Celerena* in the Lepidoptera Heterocera) the name of *Craspedosis*, n. gen.

CELERENA VULGARIS, n. sp.

Allied to *C. perithea*, of Cramer, from Amboina, but with the transverse golden-yellow band of primaries twice as wide, and the black-brown border of secondaries only half as wide: expanse of wings 2 inches 4 lines.

This is evidently a very common species.

The above-named genus will include the following species:—*C. lerne*, Boisd.; *C. divisa*, Walker; *C. andamana*, Felder; *C. commutata*, Walker; *C. mutata*, Walker; *C. perithea*, Cramer; *C. proxima*, *spreta*, and *connexa* of Walker; and *C. eucnemis* of Felder.

5. Contributions to a General History of the *Spongiadæ*. By J. S. BOWERBANK, LL.D., F.R.S., &c.—Part VIII.

[Received November 8, 1876.]

(Plates LXXVIII.–LXXXI.)

The Sponges described in the present contribution to a general history of the Spongiadæ are rare and very remarkable species. Three of them are, to the best of my knowledge, unique specimens; and the fourth, *Chalina verticillata*, elucidates in a singularly striking manner the structure and history of a diluvial fossil sponge enveloped in flint, which has for a long period been a mystery to palæontologists.

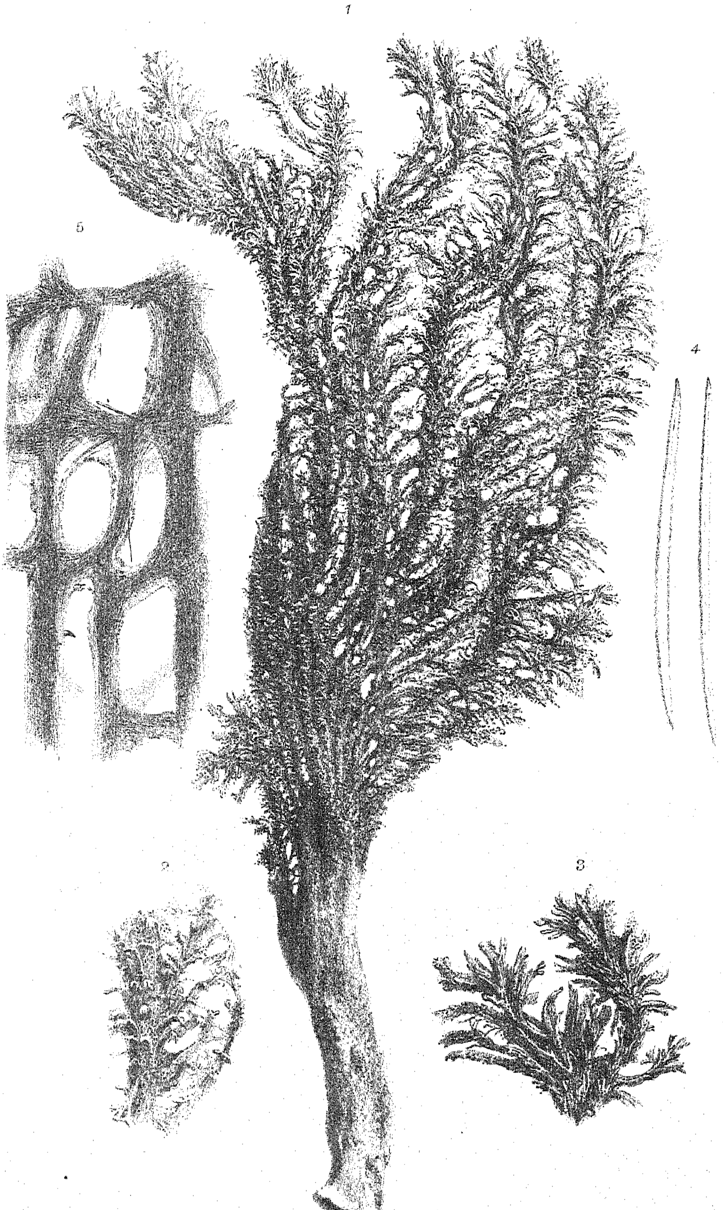
DESMACIDON PLUMOSA, sp. nov. (Plate LXXVIII.)

Sponge elongately fan-shaped, pedicellate; pedicle long and stout, smooth, fan-shaped, expansion prominently hispid on both planes. Oscula simple, dispersed, minute, and numerous. Pores inconspicuous. Dermal membrane aspiculous. Skeleton reticulated, rete irregular; primary fibres stout and solid, radiating irregularly from the discal end of the pedicle in the same plane; secondary fibres radiating from the primary ones at nearly right angles to the planes of the sponge, short, slender, and delicately plumous. Spicula subfusiform-acerate.

Colour, in the dried state, fawn-yellow.
Hab. Sharks' Bay, Western Australia.
Examined in the dried state.

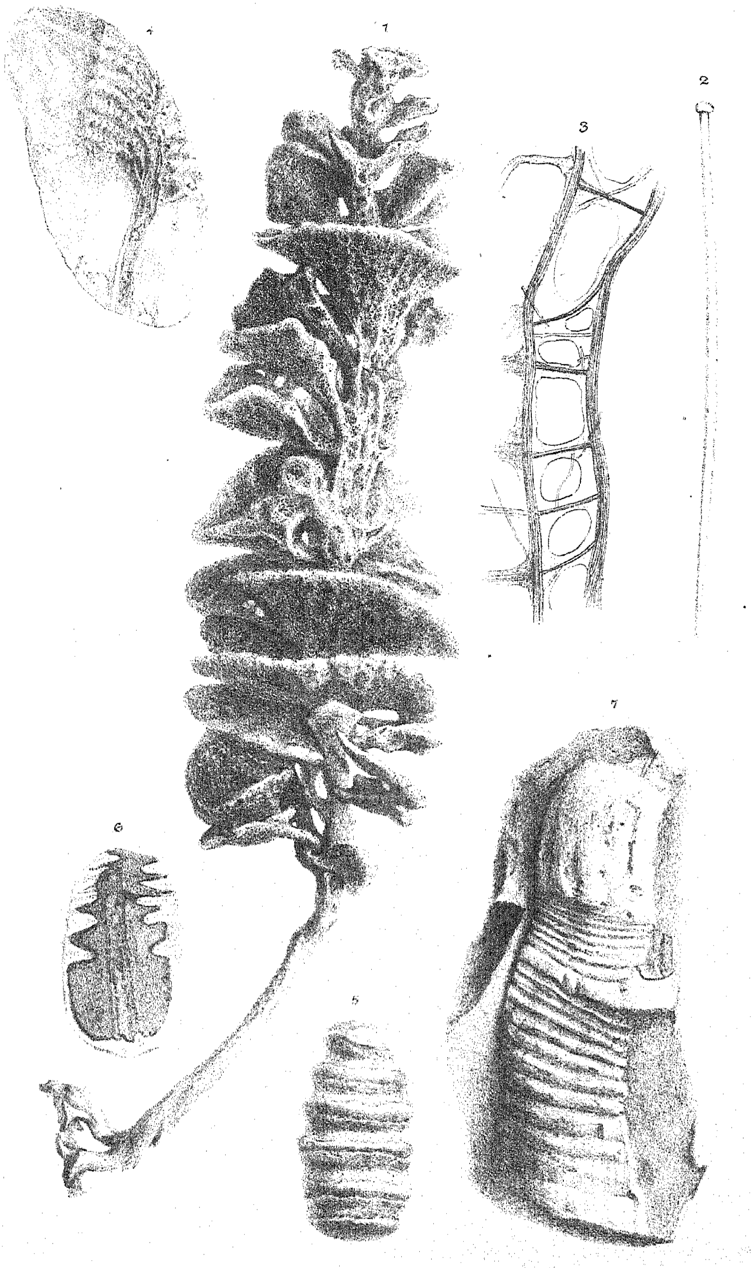
I obtained this singular and interesting sponge among many others from a dealer in specimens of natural history, who stated that it was from Sharks' Bay, Western Australia. It is 15 inches in height, and about 5 inches broad at near the middle of the fan-shaped expansion. No portion of the basal attachment remains; and the pedicle in its present state slightly exceeds 4 inches in length. It is slightly

P. Z. S. 1876. Pl. LXXVIII.



Dinkel del. et lith.
W. West & Co. imp.

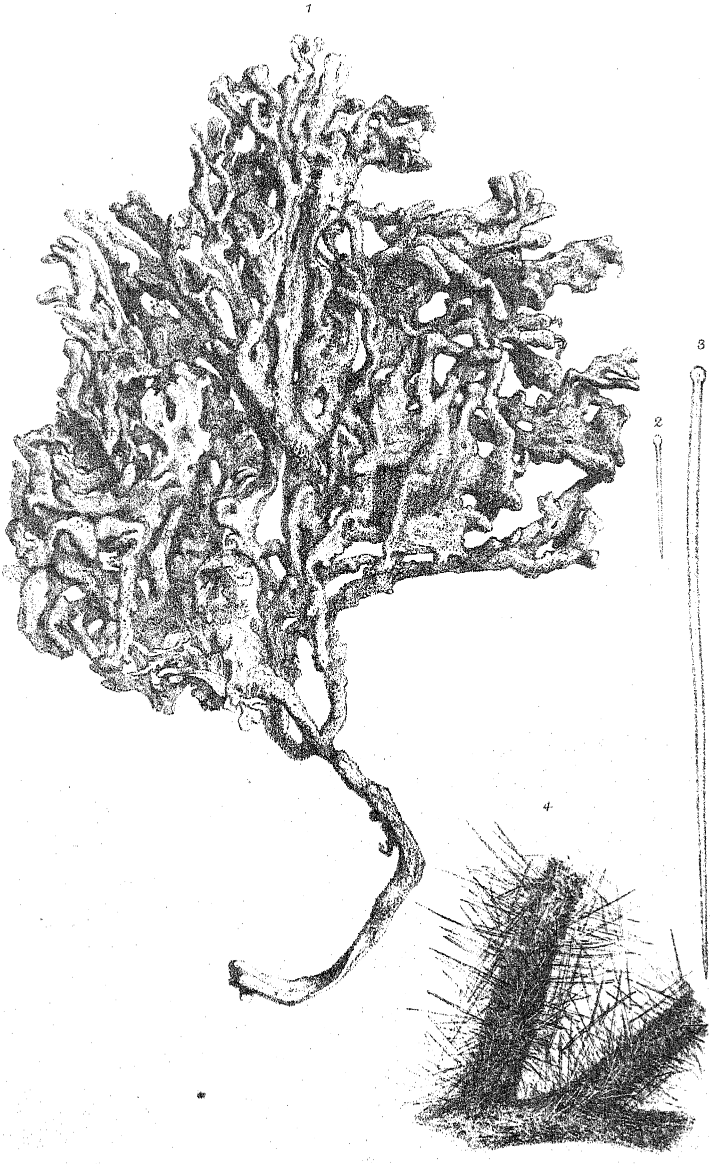
Desmacidon plumosa.



Dinkel del. et lith.

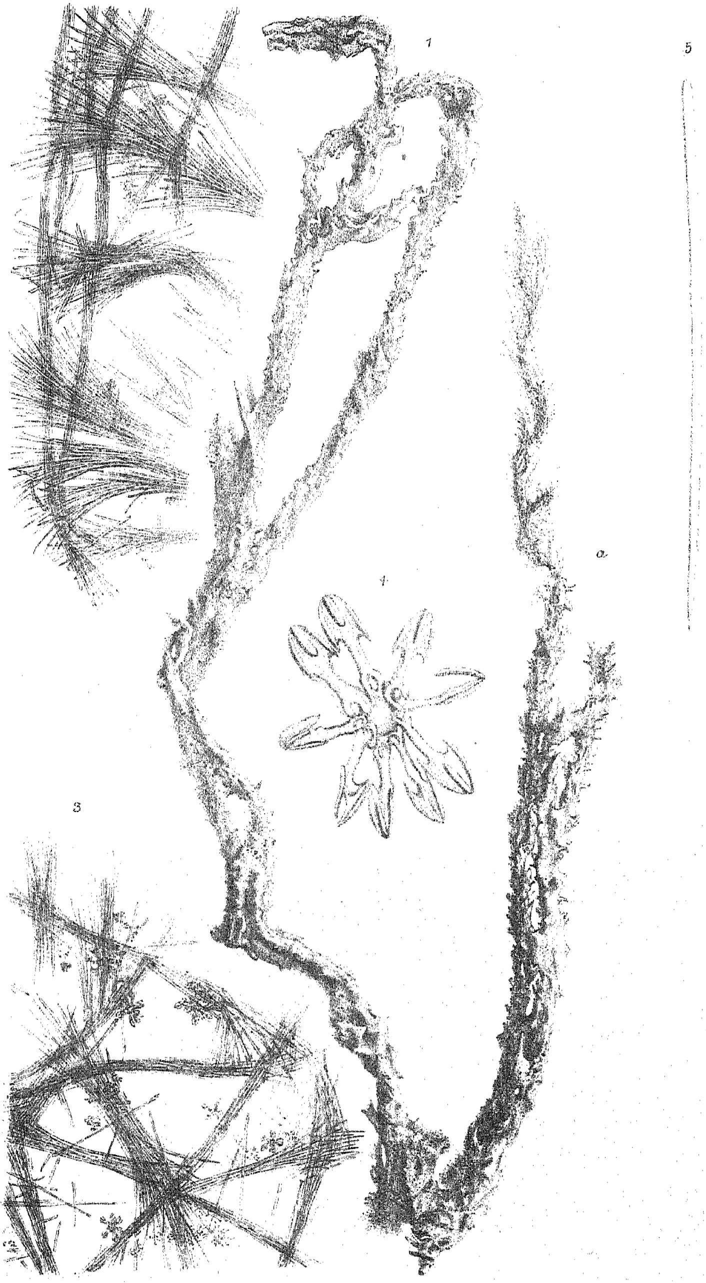
W. West & Co imp.

Chalina verticillata.



Dinkel del. et lith.
W.West & Co. imp.

Ophlitospongia fucoidea.



Dinkel del. et lith.

W. West & Co. imp.

Raphiodesma radiosa.

compressed and very solid in its structure. The hispidity of the surfaces is produced by the projection of the secondary lines of the skeleton, which are uniform in length on both surfaces of the sponge; but they are more abundantly produced on the surface presented to the eye in the figure than on the opposite one; and they always terminate in plumous expansions. The primary lines of the skeleton are projected in slightly meandering lines, but always in the same plane; and none of them exceeds about a quarter of an inch in diameter. The oscula are abundantly dispersed on the primary lines of the skeleton; they are very minute, and are scarcely perceptible without the aid of a lens of about 2 inches focus. The dermal membrane is closely adherent to the spiculo-fibrous structures of the skeleton; and it can be seen distinctly only when small portions of the sponge are mounted in Canada balsam, in the form of thin expansions within the areas of the rete of skeleton-fibres. There is but one form of spiculum, the subfusiformi-acerate one; their average proportions are $\frac{1}{107}$ inch in length, and $\frac{1}{2608}$ inch in diameter. The general aspect of this sponge is very remarkable: all the secondary plumous fibres projected from either surface rise to nearly the same height, rarely exceeding that of about a quarter of an inch; and all of them assume the same plumous expansion of their apices. The skeleton-structure is purely that of a *Desmacidon*; but its peculiar mode of development differs widely from every other species of the genus with which I am acquainted.

CHALINA VERTICILLATA, sp. nov. (Plate LXXIX.)

Sponge pedicellate; pedicle long, smooth; proximal portion without sponge-plates; distal portion sustaining a succession of numerous thin perfoliate more or less circular cup-shaped plates of sponge, decreasing in size to the apex. Surface—upper and under surfaces of the plates rugose, margins entire. Oscula simple, dispersed, numerous on the under surfaces of the plates. Pores inconspicuous. Dermis reticular, rete irregular; dermal membrane sparingly spiculous; spicula depresso-spinulate, same size and form as those of the skeleton, dispersed. Skeleton symmetrical, radiating irregularly from the centres of the plates; primary and secondary lines slender and delicate, not very numerously spiculous; spicula depresso-spinulate, rather variable in length and diameter. Interstitial membranes sparingly spiculous; spicula same as those of the skeleton.

Colour, in the dried state, nut-brown.
Hab. Fremantle, Australia (*Geo. Clifton, Esq.*).
Examined in the dried state.

The height of this sponge is 13 inches, and its greatest breadth 3 inches. At 5 inches from the basal attachment the pedicle divides and becomes two branches; at the part from which the lowest of the plates of the sponge is projected, and thence to the apex, they are produced in a rather irregular series. The form of this sponge is remarkable and unusual; but the species in course of description is not the only one in which we find it. The whole of such sponges appear to be Australian. I have other specimens in my possession of very much greater dimensions, and among them some rather exceeding 3 feet in length, having plates exceeding 5 inches in diameter; and one of the largest, at about the middle of the series of plates, divides, and each stem supports a separate series of plates. The plates of these sponges are not projected from the pedicles at right angles to them; they always assume a more or less ascending direction, so that they form an ascending series of rather irregularly shaped shallow cups.

The dermal rete is rather more strongly produced than the skeleton-structures beneath it, and it is quite irregular in form. Very little of the dermal membrane remains; the small fragments that were apparent were furnished with a few dispersed spicula.

The skeleton-structure is rather slender and delicate. The primary lines vary to some extent in their diameter; and in some there are a greater number of spicula than in others. The secondary lines of the skeleton are also variable in the number of their spicula and in their mode of disposition.

These singularly formed sponges are interesting, not only on their own account, but also for affording us an explanation of a remarkable series of fossils that are not unfrequently found in a more or less perfect condition in our diluvial gravel, and which have been conjectured by some geologists to have been allied to the Trilobites, while others have believed them to have been Pennatulæ.

I had longitudinal sections made and polished of several of these fossils; and on examining them by direct light with a power of 100 linear I found in some of them traces of sponge-structure, but so indistinct as to afford very unsatisfactory evidence of their real nature; but in some, as in the specimen represented by figure 4, Plate LXXIX., I found unmistakable proofs of a central axial column; and in this specimen the included sponge was of a nut-brown colour, while the enveloping one was of a milk-white; and the two were cemented together by an intervening thin stratum of semitransparent silex, without any indication of sponge-tissue in it. This peculiarity is strictly in accordance with the natural laws of the Spongiadæ, as when two living specimens of the same species touch each other, they unite and become as one sponge; but, however closely two specimens of different species of sponge may envelop each other, they never unite and become one inseparable mass, however closely they may be allied to each other in anatomical structure.

In each section of the brown verticillate fossil sponge represented by figure 4, when viewed by direct light with a power of 175 linear, there were unmistakable evidences of a very delicate spongeous reticulation; while in the white enveloping sponge traces of a very different character of reticulate spongeous structure could be distinctly seen between the leaves of the verticillate sponge. In the latter sponge there are numerous specimens of foraminated shells of various species, such as are frequently found embedded in recent sponges of a similarly complicated structure. The enveloping sponge does not appear to be always of the same species as the sponge represented by figure 4. In the specimen represented by figure 5 (Plate LXXIX.) it is apparently the same as in that represented by figure 4; but it has not so completely involved the verticillate species, the margins of the plates of which are still uncovered.

For the most perfect specimen of these enveloped species of sponges I am indebted to my late friend Dean Buckland, who could not imagine what it could be, unless it represented an animal allied to the Trilobites, the apparent smooth head and striated body having impreseed that idea upon his mind; but on my pointing out to him a small spot on the middle of the smooth end of the mass, which I conjectured might be the basal end of the pedicle, he presented it to me that I might, if possible, clear up our doubts regarding its structure. I accordingly marked it for cutting in such a direction as to make a section of the supposed pedicle, as well as through the centre of the plates of the sponge; and the result was the production of the specimen represented by figure 4, Plate LXXIX., completely confirming the ideas regarding the nature of these fossils that had previously arisen from my examinations and comparisons of the fossils with the singular verticillate sponges from the Australian seas.

Very few of these enveloped specimens of verticillate sponges are in so perfect a state of preservation as that represented by figure 4. By far the greater number of them appear to have been in a very young state when thus enveloped by the parasitical sponge; and their size has been still further curtailed, and their true form obscured in the fossil state, by the destructive attrition that they have undergone in the diluvial gravel, in which they are by no means scarce. I have in my own collection 33 specimens of various sizes and states of preservation, among which there is one that is evidently the termination of a fossil specimen quite as large as the recent one figured, the greatest breadth of the spongeous plates being two and a quarter inches.

These fossils, from the general character of the siliceous matter in which they are embedded, probably belong to the chalk formation; but I have never yet obtained one from that deposit, and therefore the formation whence they are derived cannot be positively determined. It is a remarkable circumstance that these diluvial fossils should have their nearest analogues among the recent Australian sponges, and that the same may be said of the fossil fruits of the London-clay formation.

OPLITOSPONGIA FUCOIDES, sp. nov. (Plate LXXX.)

Sponge pedicellate; pedicle long, slender, smooth, ramifying and expanding into numerous compressed fucoideal branches disposed in nearly the same plane, so as to be rudely fan-shaped. Surface uneven, minutely hispid. Oscula simple, minute, dispersed. Pores inconspicuous. Dermis irregularly fibro-reticulate; rete abundantly punctiunculate, sparingly spiculous. Dermal membrane abundantly spiculous; spicula spinulate, smaller, shorter, and more attenuated than those of the skeleton. Skeleton-fibres smooth, punctiunculate, abundantly furnished with subfusiformi-spinulate spicula, radiating irregularly from the centres to the circumferences of the branches; spicula very irregular in length.

Colour, in the dried state, red.
Hab. Sharks' Bay, Western Australia.
Examined in the dried state.

I obtained this interesting species from a dealer in natural-history specimens. It is 9 inches in height and 7 inches in greatest breadth. Its mode of growth is very singular. It consists of a number of separate irregularly shaped fan-like aggregations, by anastomosis of the smaller branches, all projected in nearly the same plane, the whole forming a complicated fan-shaped mass of branches, from many of which, in numerous parts, by a careful examination, minute leaves of fuci may be seen projected; but whether these are separate and independent growths, or projections from an originally enveloped fucus, it is difficult to decide, as I could not trace any portions of the stem of a fucus in numerous sections made at right angles to the surface of the sponge, even when mounted in Canada balsam. From the very young condition of all these minute fuci, and there being two species of them, and several other parasitical bodies, such as little Barnacles, embedded in some of the branches, I am inclined to believe the small fuci to be parasites on the sponge, and not the sponge on a fucus.

The dermal surface is furnished with an irregular fibro-reticulate rete, the fibre of which does not appear to be so profusely furnished with spicula as those of the skeleton. The minute hispidation of the surface is produced by the projection of the spicula of the fibres of both the dermal rete and the skeleton immediately beneath it. This character is not visible, excepting in thin slices of the sponge made at right angles to the dermal surface when mounted in Canada balsam. The fibres of both the surface and the skeleton are very remarkable; their surfaces are profusely punctiunculated; this character is best seen in the fibres of the dermal rete, the surfaces of which are usually less abundantly spiculous than those of the skeleton. These minute dottings of the surfaces of the fibres require a power of not less than 300 linear, when sections of the sponge are mounted in Canada balsam, to render them distinctly to the eye. I have never seen this remarkable dotting of the surface of the fibres of a keratose sponge in any other species of sponge; and in the one in course of description it forms a very decisive specific character.

The structure of the skeleton is very irregular and complicated. The fibres are stout and rigid, and are profusely furnished with their defensive spicula. These organs vary to great extent in their length and diameter; one of the largest measured $\frac{1}{66}$ inch in length, while one of the numerous short ones measured only $\frac{1}{300}$ inch in length; the two forms are distributed on the fibres without the slightest approach to order. This sponge is a very remarkable species of the genus. It is unlike any of its numerous congeners.

Raphiodesma radiosa, sp. nov. (Plate LXXXI.)

Sponge irregularly rameous; branches rather slender. Surface uneven and irregular, both strongly and minutely hispid. Oscula simple, dispersed. Pores inconspicuous. Dermal membrane pellucid, abundantly spiculous, reticulated; spicula of the rete of the same form as those of the skeleton. Tension-spicula acuate, slender, few in number; retentive spicula dentato-palmated inequianchorate, congregated in rosette-shaped groups, rather numerous, and, rarely, simple and contort bihamate spicula. Skeleton-fasciculi numerous, abundantly spiculous; spicula acuate, rather stout. Interstitial membranes sparingly furnished with the same tension- and retentive spicula as those of the dermal membrane.

Colour, in the dried state, light grey.

Hab. Savanilla, South America.

Examined in the dried state.

I received this very remarkable sponge from Mr. Moore, of the Liverpool Free Library and Museum, for examination and description. He informed me that it was collected at Savanilla, a sea-port town on the South-American coast, latitude 11° S., longitude 75° W.

What has been the nature of the basal attachment of this sponge is very doubtful; as it is at present, it appears as if it had been broken off immediately above the basal attachment. The length of the specimen represented by the figure in Plate LXXXI. is 19 inches; and its diameter averages $\frac{5}{8}$ of an inch at three inches above its present base. The whole of the surface is very uneven, and it is irregularly studded with numerous conical projections about a line or a line and a half in height; and these appear to be produced by the occasional projection of the minute irregular ramifications of the young and immature branches of the sponge at *a*. Beside these conical organs, the surface is abundantly but very minutely hispid; and this affords an excellent specific character. It is produced by the gradual radiation of the distal extremities of the fasciculi of the skeleton immediately beneath the dermal membrane, as represented by fig. 2, Plate LXXXI. This singular provision of nature for the defence of the dermal structure of the sponge is very remarkable and especially characteristic; but it can only be seen to advantage in a thin section of the sponge made at right angles to the surface, mounted in Canada balsam and viewed as a transparent object with a microscopical power of about 100 linear. The amount of the projection of the distal terminations of the spicula of these fasciculi scarcely exceeds about one third or half the length of a single spiculum; but they form a most efficient protection to the dermal structure of the sponge.

The dermal membrane affords especially valuable specific characters independently of the remarkable radial groups of defensive spicula which pass through its structure. It is very pellucid; and the rete with which it is furnished is strongly but irregularly produced, and the areas are large and mostly modifications of triangular or quadrangular forms; and where any portion of it terminates without contact with any other portions of its structures, the spicula of the termination radiate on the plane of the membrane like those which are projected through the dermis. This habit of terminal radiation of the fasciculi prevails in several other species of *Raphiodesma*. The tension-spicula are very unevenly distributed; in some parts there are very few of them, while in others they occur dispersed in very considerable numbers.

The rosette-shaped groups of dentato-palmated inequianchorate retentive spicula are rather sparingly but equably dispersed on the inner surface of the areas of the dermal network. They very closely resemble those of the type of the genus, the British species *Raphiodesma lingua*, both in the size of the groups and of the individual spicula of which they are constructed, but they are not nearly so numerous in each group as in the type specimen.

I have never found these rosette-like groups of inequianchorate spicula in any other sponges than those of the genus *Raphiodesma*, and not in every species of that genus; so that, although they cannot be considered of generic value, they are important indications of the genus whenever they are apparent. A few simple or contort bihamate retentive spicula were occasionally observed on the interstitial membranes of the skeleton; but their number was so small as to render their presence of but little value as specific characters.

The structures of the skeleton-fasciculi are longer and more continuous than in any other species of the genus with which I am familiar, so much so that the skeleton might very readily be mistaken by a hasty observation for that of a *Desmacidon*; but this illusion is dissipated by the fact that they do not form a continuous network of solid fibre as in the last-named genus, but frequently terminate in radial expansions like those of the dermal membrane and its external protected groups of defensive radiating spicula. A few rosette-shaped groups of inequianchorate spicula and a few of the bihamate ones are occasionally found on the interstitial membranes.

This sponge is the only specimen of the species that I have seen; and it is a very remarkable one. By far the greater proportion of the known species of the genus are more or less of a solid massive form; and this variation strongly illustrates the fact that there is little or no dependence to be placed on external form in regard to either generic or specific characters.

EXPLANATION OF THE PLATES.

PLATE LXXVIII.

Desmacidon plumosa.

Fig. 1 represents the sponge in its dried state, rather less than half its natural size.

2, 3. Two small portions of the sponge, of the natural size, exhibiting the plumous nature of the hispidation of the surface.

4. Two of the subfusiform acerate spicula of the skeleton, × 308 linear.

5. A small portion of the skeleton-structure, × 50 linear.

Plate LXXIX.

Chalina verticillata.

Fig. 1 represents the sponge, about half its natural size.
2. One of the depresso-spinulate spicula of the skeleton, × 420 linear.
3. A small portion of the scalariform structure of the skeleton, with portions of the interstitial membrane, × 123 linear.
4 represents a longitudinal section of a diluvial flint presented to me by the late Dean Buckland, containing a fossil sponge closely allied to *Chalina verticillata*, exhibiting a section of the pedicle and the series of verticillate plates of the sponge, very closely resembling the recent sponge, natural size.
5 represents a small specimen of a fossil verticillate sponge, the margins of the plates remaining uncovered, while the intervals between them are filled by the enveloping sponge, natural size.
6. A longitudinal section of a small specimen closely resembling the one represented by figure 5, exhibiting the immature development of the verticillate plates of the sponge and a section of its central column, natural size.
7. A fine specimen of a verticillate fossil sponge, only half of which is completely enveloped longitudinally by the parasitic sponge, natural size.

Plate LXXX.

Ophlitospongia fucoidea.

Fig. 1 represents the sponge, two thirds its natural size.
2. One of the shortest of the spicula of the skeleton-fibre, × 250 linear.
3. An average-sized long spiculum of the skeleton-fibres, × 250 linear.
4. A small portion of the skeleton-fibre, exhibiting the great number of the spicula with which they are furnished, and the mode of their disposition, × 80 linear.

Plate LXXXI.

Raphiodesma radiosa.

Fig. 1 represents the sponge, rather less than half the natural size.
2. The marginal portion of a thin slice of the sponge at right angles to the surface, exhibiting the radiation of the distal terminations of the skeleton-fasciculi, projected through the dermal membrane to form the minute hispidation of the surface, × 61 linear.
3. A small portion of the dermal rete, × 61 linear.
4. One of the rosette-shaped groups of dentato-palmated inequianchorate retentive spicula, × 360 linear.
5. An acuate skeleton-spiculum, × 360 linear.

December 5, 1876.

Dr. E. Hamilton, V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of November 1876:—

The registered additions to the Society's Menagerie during the month of November were 85 in number. Of these, 36 were acquired by presentation, 14 by purchase, 4 by exchange, 3 by birth, and 28 were received on deposit. The number of departures during the same period, by death and removals, was 97.

The most noticeable additions during the month of November were as follows:—

1. Four Brazilian Cormorants (*Phalacrocorax brasilianus*), purchased Nov. 17. Of this small Cormorant of the New World no examples have ever reached us before. The birds have been placed in the Fish-house, next to the American Darters.

2. A Hooded Crane (*Grus monachus*), deposited by Mr. W. Jamrach, November 21st, under an arrangement that it is to be purchased on the 1st of January next if doing well at that time.

This species, which is quite new to us, is readily distinguishable from the allied *G. leucauchen* (also from Japan) by its smaller size and the greater amount of white on the neck. Its arrival renders our series of Cranes very complete, comprising, as it now does, 19 examples belonging to 13 species.

The following extract was read from a letter addressed to the Secretary by Count T. Salvadori, C.M.Z.S., dated Turin, November 28th:—

Dr. Beccari has received from Mr. Bruijn, of Ternate, the announcement of the discovery of a new species of *Drepanornis* from the most inland point of Geelvink Bay, New Guinea. This bird is said to differ from *D. albertisi* in having the head, the hind neck, the back, and the breast black. The long feathers on the sides of the breast are said to be most brilliant. We hope to receive before long examples of this wonderful new bird.

The following papers were read:—

1. Corrections of and Additions to the "Raptorial Birds of North-western India."—Part III.* By ANDREW ANDERSON, F.Z.S. &c.

(Plate LXXXII.)

[Received November 6, 1876.]

The acquisition of two very interesting additions—the one an eastern and the other a western one—enables me to lay some further information respecting the Raptorial birds of these provinces before the Society. It is a strange coincidence that both these stragglers should have been obtained on my old collecting-ground, on the banks of the Mainpuri Canal, within a few miles of each other, as well as within the same month.

The numbers and asterisk preceding the names have the same significance as before.

The two additions now made bring up my list to fifty-four species.

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* For Part II. see P. Z. S. 1876, p. 310.

*41 *bis*. POLIOAËTUS PLUMBEUS. (Plate LXXXII.)

Haliaëtus plumbeus, Hodgson, J. A. S. B. vi. p. 367.
Poliaëtus plumbeus, Jerdon, Ibis, 1871, p. 336.

The accompanying Plate of this little-known Fish-Eagle will enable ornithologists to readily distinguish its characters from the allied though very distinct *P. ichthyaëtus*, from which species I have reason to believe it has not always been discriminated. As the present example, a mature ♂, making the third recorded occurrence of this Eagle in the plains*, is identical in every respect with the pair referred to in 'Stray Feathers'†, any further description of its plumage and habits would be superfluous.

It was killed at Ghirar, in the Mainpuri district, on February 9th of the present year; and had my gun been up at the time, the prize would have been easily secured, as it remained seated on a tree on the opposite side of the canal for fully half an hour. Once disturbed, the bird became very impatient; and though only taking small flights and never leaving the canal, it changed its position a dozen times and entailed a deal of manœuvring before allowing itself to be bagged. The canal was at low-water mark; and the fish which had congregated in the deep clear pools must have been the attraction to this place.

Carefully measured in the flesh, the following are the results:—Length 23·5 inches; wing from carpal joint 16·5; tail from vent 9·6; tarsus 3.5; bill, straight, including cere, 1·7; greatest expanse of foot—length 5·0, breadth 4·6, centre toe and claw straight 3·1.

The legs and feet were white, washed with light livid blue; the *upper* mandible was blue-black, the blue being distinctly visible; the cere, gape, and *lower* mandible were leaden-blue, the blue being very distinct and a good deal *lighter* than the *upper* mandible; the irides were amber-colour, and the claws were black. The pads or soles of the feet were as rough as a nutmeg-grater, thus admirably adapting them for the capture of its slippery prey.

In concluding my remarks, I wish to draw attention to the wonderful development of the ear-orifice, as well as to the slight difference there is between the sexes of this Eagle. The females, I should say, averaged from 24·5 to 25·5 inches in length, with a wing from 18 to 18·5; the males from 23·5 to 24·5, with a proportionately smaller wing. For convenience of reference, I append dimensions of the three adult specimens I have had an opportunity of examining in the flesh, and regarding the sexing of which there is no doubt:—

Sex.	Locality.	Length. in.	Wing from carpal joint. in.	Tail from vent. in.	Tarsus. in.
♂.	Kumaon......	23·0	17·5	10·0	3·3
♂.	Mainpuri......	23·5	16·5	9·6	3·5
♀.	Kumaon......	24·5	18·0	10·5	3·4

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* One, Etawah (Brooks); one, Lucknow Museum (Anderson); one, Mainpuri (Anderson).

† *Cf.* 'Stray Feathers,' vol. iii. p. 385.

I am not aware whether the nestling- and first plumage of *P. plumbeus* has yet been described.

*10. FALCO SACER, Schl.

This is probably the least to be expected of all the Raptores I have hitherto recorded from this part of the country. In short, it is the first occurrence of this noble Falcon known to me so far east of the desert country of the Punjab; and as such it makes an exceedingly interesting addition to my previous lists.

It was on February 28th last, just three weeks to a day after the capture of *P. plumbeus*, that the Saker now referred to was obtained. The plain on which this bird was shot extends for miles along the banks of the Mainpuri Canal, commencing at the junction of the Etawah road, at a place called Dhurous.

There are few localities I have worked more thoroughly than this; and it offers attractions equally great to the sportsman and naturalist. The solitary trees that are studded about this open desert-looking country are each occupied by the larger eagles and birds-of-prey generally; and the marshes offer excellent retreats for water-birds, which in numbers and variety are probably not surpassed in any part of the world. The dense fringe of brush-wood of young Sisso-trees that clothe both banks of the canal, afford shelter to our migratory Thrushes, such as *Pitta bengalensis*, *Petrocossyphus cyaneus*, *Orœcetes cinclorhynchus*, *Turdus unicolor* and *T. atrogularis* (the last-mentioned having occurred in considerable numbers last winter); while the Babool trees that overlook the water are a sure find for Brooks's new Leaf-Warbler (*Reguloides subviridis*), as well as for the *Phylloscopinæ* generally, of which group my list comprises no less than a dozen species*. The labyrinth of rank high reeds and rushes which grow in patches where the water has oozed through the bank, in many places sufficiently dense to hold pigs, harbours Rails, immense flocks of Passerine birds (including *Ploceus bengalensis*, a species not recorded by Jerdon from the N.W. P.), and several Reed-Warblers, the most interesting being the skulking *Locustella hendersoni*, and *Sylvia melanopogon*, which are amongst the least-persecuted of birds, owing to the impregnable nature of the ground they affect. Should you have exhausted the ornithological treasures of an elysium like this, you have merely to make a détour of a mile or two to fall in with Blackbuck, or, better still, to course Fawns, Hares, or the Desert-Fox†.

To return to *Falco sacer*, it was just as we had run a hare to ground‡, late on the evening of the afore-mentioned date, and I was meditating with two of my brother officers who were out with me whether we had time to dig out the animal, that a Falcon was seen scouring the plain, apparently in search of food. My shikaree soon produced the bird, the first Saker I had seen in the flesh; and though it is pale rufescent, or "desert-colour" generally, the oval spots on its rectrices, and light-coloured soft parts, as compared with *Falco jugger*, convinced me that it did not belong to that species, it was not until the following morning, when I had an opportunity of comparing it with several Laggars, that I really felt comfortable in my identification.

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* A Catalogue of the Birds of the Plains *proper* that I have recently drawn up for the 'Provincial Gazetteer,' contains 443 species; but of course this list makes no pretension to completeness.

† *Vulpes leucopus* is not recorded by Jerdon from the N.W. P.; but it is the Fox of the *large sandy downs* of all the districts to the *west of Cawnpore*. Not long ago I killed a splendid female of this fine species within a mile of the city of Futtehgurh.

‡ Jerdon, it will be observed, on referring to his 'Mammals of India,' p. 224, was well aware of the eccentric habit of this common Indian Hare (*Lepus ruficaudatus*).

The bird proved to be a very old but small male, measuring 18·5 inches in length, with a wing of 13·5, or about the dimensions of an undersized ♀ *F. jugger*. From the *adult* of that species it differed most conspicuously in the coloration of its soft parts, the legs, feet, and cere of the latter being *bright orange*, while in the former (Saker) the corresponding parts are of a *light dingy yellow*; the bill too was paler, the basal three fourths of the upper mandible, as also the whole of the lower one, being of a *pearly white tinged with pink*.

As the various phases of the plumage of *F. sacer* have been so fully described by Hume*, I will merely remark in reference to the adult state of the present specimen, that the head and nape (particularly the latter) are pure white, with narrow central shaft-stripes, the mantle is of a uniform pale rufescent hue, the feathers being broadly edged with rufous of a darker shade, that *all* the rectrices have large oval white spots on both webs, with the exception of *one of the central feathers, on which the spots have almost disappeared*, and that the chin, throat, and breast are pure white, with only a few clove-brown spots across the breast, the markings on the sternum, flanks, abdomen, and tibial plumes being more numerous and having the form of ovate streaks instead of spots.

Before leaving the subject of *F. sacer*, I should not omit to mention that the specimen in question has an abnormally shaped upper mandible, the tip of the bill, which is very sharp and pointed, being produced a third of an inch beyond the tooth or notch, and rounded over exactly as it is in the genus *Palæornis*. In reference to this deformity, the following remarks by Mr. Gurney (*in epist.*) will be read with interest:—"May not your *F. sacer* with the deformed bill have been a trained bird that had been turned off when it got old and past its best? I have known birds of prey acquire a similar prolongation of the upper mandible in confinement, though perhaps not to the same extent" †.

The Falcon, however, was in excellent condition, and showed no sign of previous captivity. Furthermore, it was evidently hunting on a plain that abounded with Hardwick's Uromastix, a Lizard that Jerdon has pointed out, on the authority of Punjab falconers, as constituting its "favourite food" in a feral state‡; and as I can hardly believe that a Saker that had once been trained to strike such large game as the Bustard and Crane would revert to reptilian food,

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* *Cf.* 'Stray Feathers,' vol. i. p. 152 *et seqq.*

† I possess a female specimen of *Pyrrhulauda grisea* that has a similar prolongation of the upper mandible.

‡ *Cf.* 'The Ibis' for 1871, p. 239.

I trust Mr. Gurney will pardon my protesting against the belief that my Falcon was a "ticket-of-leave" bird.

48. POLIORNIS TEESA, Frankl.

In the coloured eggs of the White-eyed Buzzard referred to in my last communication on this subject*, we have a very good illustration of the importance of oology as an element in the classification of birds, showing that *Poliornis* forms, as it were, the connecting link between the genera *Buteo* and *Circus*†.

During the past spring I was so fortunate as to obtain two pairs of even better-coloured eggs than those above alluded to. These I will endeavour to describe as follows :—(i.) Nest of two eggs, Futtehgurh, 5th April, 1875. These are somewhat undersized, in shape of a broad oval, and freely marked with reddish-brown specks at the obtuse end. In one specimen the markings extend more or less all over the surface of the egg. (ii.) Nest of two eggs, Futtehgurh, 27th April 1876. A full-sized pair; one is a broad oval, the other somewhat pyriform. The former has a few russet-brown blotches at one end only, one of the marks being the size of a large pea. The colouring-matter in the companion egg is confined to the compressed end, covering about a fifth of the surface, and consists of delicate russet-brown veined or map-like markings, which are so characteristic of the Bunting group.

Admitting my weakness for oological discoveries, I must not omit to mention that on April 12th I took a clutch of *five* eggs of *Micronisus badius*, which is in excess of the number hitherto recorded. Another sitting of four, taken three days later, are freely marked with minute specks of a reddish-brown colour. I venture to say Mr. Hume is in error in assigning only three eggs to this Hawk as a general rule‡; for, according to my experience, four is the normal number if the bird is allowed time to lay the full complement.

I have also recently come across two very prolific pairs of *Athene brama*, capturing both the ♀ birds in their nest-holes : the one had laid *six* eggs ; while the other was sitting on the usual number, four, but laid a fifth in my hand.

Though not coming strictly within my limits, I may mention the capture at Allahabad, on Oct. 10th of the past year, of a ♀ *Spizaëtus nipalensis*, regarding which Mr. Cockburn, the Curator of the Museum at that place, has favoured me with the following particulars :—Length 27·5 ; expanse 58·5 ; wing 17·5 ; tail from vent 12 ; tarsus 3·5. Crest rudimentary. This is the first specimen of this bird that has, to my knowledge, been procured in the Allahabad district §. I knocked it over with a charge of No. 10 shot while in the act of devouring a Crow-Pheasant."

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* *Cf.* P.Z.S. for 1875, p. 25.

† *Cf.* 'Nests and Eggs,' pt. i. p. 51, where the only known eggs of *P. liventer* are described as having a "very few tiny pale brown and purplish brown specks" on them.

‡ *Cf.* 'Nests and Eggs,' pt. i. p. 25.

§ Mr. Hume, in his article on *Spizaëtus cirrhatus*, 'Rough Notes,' p. 206, records *S. nipalensis* from Etawah ; but I have not yet met with this species myself in the Plains.

To Dr. Bonavia, of Lucknow, I am indebted for a third Oudh-killed specimen of *Erythropus pekinensis*. Though an adult ♂, it has a few minute specks on the sternum; and in reference to the difference in the plumage of the two species of Lesser Kestrels, I may add that Mr. Gurney agrees with me that the only *constant* difference between *Erythropus cenchris* and *E. pekinensis* is the breadth of grey on the wing.

Athene radiata is, I find, very common in the districts north of the Ganges; though somewhat local, in many places it almost replaces *A. brama*. I procured a fine series of the former at Shahjehanpore in November last, within a radius of two hundred yards of my camp. These little Owlets have the habit of sitting in pairs, and sunning themselves, frequently up to midday, before retiring to their hiding-places. One shot generally kills both birds. They utter a peculiar and, to me, a pleasant note, something of a chirp in several keys, very different from the discordant noise made by *A. brama*. The following dimensions and colours of soft parts are applicable to a dozen specimens I have examined:—

	Length. in.	Wing from carpal joint. in.	Tail from vent. in.	Tarsus. in.
♂	8·0	5·7	3·0	1·0
♀	8·3	5·9	3·1	1·1

I have also secured at Futtehgurh more examples of *Aquila pennata*, *Accipiter virgatus* (only immature ones), and *Ephialtes sunia*, all good birds for the locality. Of the last mentioned I have a live specimen in the grey phase of plumage, which swallows full-grown mice *whole*—a feat not a little surprising for a bird weighing only two oz.

2. On the Fishes of Yarkand.

By Francis Day, F.Z.S.

[Received November 20, 1876.]

In the year 1873 an expedition, under Mr. (now Sir) Douglas Forsyth, was despatched by the Government of India to Yarkand, having for one of its objects the collection of specimens of Natural History. For this latter purpose my lamented friend Dr. Stoliczka was attached to it as naturalist; and after his death the collection of fishes was conveyed to India, and subsequently forwarded to me in this country for identification and description.

The illness and subsequent death of Mr. Ford, the eminent artist, has delayed the execution of the Plates, and, as a consequence, my portion of the work.

The following notes refer to the entire collection of fishes obtained during the expedition (except, so far as I know, two specimens *).

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* Two specimens of *Schizothorax chrysochlorus*, obtained during the expedition, were presented to the British Museum. They were named after their donor, *Schizothorax biddulphi*.

With them I have compared some types of Steindachner's excellent paper on Dr. Stoliczka's 'Fishes of Tibet' (Verh. z.-b. Ges. Wien, 1866), which specimens were given me by Dr. Stoliczka.

Mr. Hume, C.B., has since then obtained a few more skins of fishes from those regions through the exertions of Dr. Scully. These have likewise been forwarded to me; and one appears to be at present undescribed; it is a very aberrant form of *Ptychobarbus*.

Order PHYSOSTOMI.

Family SILURIDÆ.

1. EXOSTOMA STOLICZKÆ.

D. $\frac{1}{6}$, P. $\frac{1}{12}$, V. $\frac{1}{5}$, A. 6, C. 15.

Length of head from 4 in the young* to $5\frac{2}{3}$, of caudal 8, height of body $7\frac{1}{4}$ in the total length. *Eyes* minute, situated in the middle of the length of the head; the width of the interorbital space equals half that of the snout, or the distance between the eye and hind nostril. *Head* depressed, as broad as long, and obtusely rounded. Mouth inferior; lips thick, and studded with small tubercular elevations; the upper and lower lips continuous at the angle of the mouth; but the transverse fold across the lower jaw is interrupted in the middle. Nostrils close together, the anterior round and patent, the posterior tubular: a barbel divides the two nostrils; it is situated on a bridge of skin, below which the two nostrils are continuous. *Barbels*: the nasal ones reach the hind edge of the eye; the maxillary ones have a broad basal attachment, and reach the root of the pectoral. Of the mandibular barbels the anterior are situated just behind the inner end of the lower labial fold; they are shorter than the outer pair, which latter extend to the gill-opening. *Gill-opening* situated on the side of the head in front and above the base of the pectoral fin. *Teeth*: several rows of pointed ones in each jaw, of which the outer is slightly the larger, rather wide apart, and with rather obtuse summits. *Fins*: the dorsal arises midway between the snout and the commencement of the adipose fin; its greatest height is one third more than the length of its base; its spine is rudimentary and enveloped in skin. Adipose dorsal very long and low. Pectoral nearly as long as the head, having its outer half horizontal and its inner vertical; its spine is rudimentary, with a broad, striated, cutaneous covering. Ventral of a similar form to the pectoral; its first and a portion of its second ray also with a striated cutaneous covering; the fin commences on a vertical line falling just behind the base of the dorsal fin; it is rather nearer the

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* The remarkable difference in the comparative length of the head to that of the total length is shown in the following figures:—

3	specimens	4	inches in length.	Head	4 to $4\frac{1}{3}$	in the total length.
4	,,	4·2 to 4·5	,,	,,	$4\frac{1}{3}$ to $5\frac{1}{4}$	,,
5	,,	5·0 to 5·7	,,	,,	5 to $5\frac{1}{2}$	,,
3	,,	6·0 to 6·6	,,	,,	$5\frac{1}{2}$ to $5\frac{2}{3}$	,,
2	,,	7·	,,	,,	$5\frac{1}{3}$ to $5\frac{1}{2}$	,,

snout than the posterior end of the adipose dorsal, and commences midway between the bases of the ventral and caudal fins; it is half higher than long. Caudal cut almost square. Free portion of the tail half higher than long. *Skin* tuberculated from the head, along the lower surface of the body, to nearly as far as the base of the ventrals. *Colours*: of a dull yellowish green, becoming lightest along the abdomen. Fins yellowish, with dark edges or bands.

Hab. Basgo, Sneema, and Leh or Ladak on the head-waters of the Indus. The longest specimen 7 inches in length.

I propose here to shortly remark upon the distinction between the six species of *Exostoma* at present known.

A. *Teeth in jaws pointed.*

1. *Exostoma labiatum.* Lower labial fold uninterrupted. The interspace between the first and adipose dorsal fins equals two thirds the length of the latter. Anal commences much nearer the base of the caudal than the base of the ventral. Mishmee Mountains, East Assam.
2. *E. blythii.* Lower labial fold uninterrupted. Interspace between dorsal fins very slight. Anal commences in last third of distance between ventral and base of caudal. Head-waters or affluents of Ganges.
3. *E. berdmorei.* Snout more pointed. Caudal forked. Tenasserim.
4. *E. davidi* *. The interspace between the first and adipose dorsal fins equals the length of the latter. Pectoral reaches the ventral. Eastern Tibet.
5. *E. stoliczkæ.* Lower labial fold interrupted. Anal commences nearer the base of the ventral than that of the caudal. Pectoral does not extend to the ventral. Upper waters of Indus.

B. *Outer row of teeth flattened.*

6. *E. andersonii.* Lower labial fold interrupted. Bhamo.

Family CYPRINIDÆ.

The majority of the fishes in the collection consist of Carps, those from the more elevated regions being confined to such as have the vent and base of the anal fin bounded by a row of tiled scales, and of the ubiquitous Loaches.

Genus OREINUS, M'Clelland.

Only one species exists in this collection, the *O. sinuatus*, Heckel, from Leh or Ladak, and which has likewise been captured in Cashmere.

Although some of the specimens were obtained in Cashmere, where the genus *Oreinus* has representatives, there was no example of one of these fishes from that locality in this collection.

Having observed upon the great variation in proportions existing in a species of *Exostoma* captured on the Hills, it may be worth while drawing attention to the same fact as occurring in specimens of this genus. Thus, in examining the following ten examples of *O. richardsonii*, Gray, in the British Museum, I found them as follows :—

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* Equals *Chimarrichthys davidi*, Sauvage.

4 specimens, in spirit, from 3·3 to 3·8 inches in length. Head *from* 4 *to* 4$\frac{2}{3}$ *in the total.*
1 specimen, in spirit, 4 inches in length. Head 4$\frac{1}{4}$ in the total.
1 ,, ,, 5$\frac{1}{2}$,, ,, 4$\frac{1}{2}$,,
1 ,, ,, 9 ,, ,, 5$\frac{1}{3}$,,
1 ,, stuffed, 10 ,, ,, 5 ,,
1 ,, ,, 15 ,, ,, 5$\frac{1}{3}$,,
1 ,, ,, 18 ,, ,, 6 ,,

Of the *Schizothorax*, or more essentially mountain-Barbels, there are several species.

2. SCHIZOTHORAX CHRYSOCHLORUS.

Racoma chrysochlora, M'Clell. Cal. J. N. Hist. ii. p. 577. t. xv. f. 3.
Schizothorax biddulphi, Günther, Ann. & Mag. Nat. Hist. 1876, xvii. p. 400.

B. iv., D. $\frac{4}{7-8}$, P. 18, V. 10, A. $\frac{2}{6}$, C. 20, L. l. 110 to 120.

Length of head 4$\frac{3}{4}$ to 5$\frac{1}{3}$, of caudal 6 to 6$\frac{1}{3}$, height of body 6$\frac{1}{2}$ in the total length. *Eyes*: diameter 5$\frac{1}{2}$ (in a fish 7 inches long), 7 to 9 in the length of head, 2 to 2$\frac{1}{2}$ diameters from the end of snout, and the same apart. Upper surface of the head nearly flat; its width rather exceeds its height, and equals half its length. Snout rather compressed, and overhanging the upper jaw. Mouth directed forwards, horseshoe-shaped, the lower labial fold interrupted in the middle. The maxilla reaches to below the front nostril. The depth of the cleft of the mouth equals the width of its gape. A very thin horny covering to the inside of the lower jaw. Posterior edge of opercle cut square. *Barbels*: the rostral ones as long as the eye, the maxillary rather longer, sometimes twice as long, and reach to beneath the middle or hind edge of the orbit. *Teeth* pharyngeal 5, 3, 2 . 2, 3, 5, pointed, and with rather compressed summits. *Fins*: the dorsal, which is as high as the body, arises midway between the end of the snout and the base of the caudal, its last undivided ray osseous, strong, finely serrated posteriorly, from a little longer than the head, in a specimen 11·9 inches in length, to $\frac{4}{5}$ the length in the adult. Pectoral as long as the head excluding the snout; it reaches halfway to the base of the anal. Anal, when laid flat, reaches about halfway to the base of the caudal, which latter fin is forked. *Scales*: the row which bears the lateral line consists of larger scales than those above or below it; those forming the anal sheath are equal to half a diameter of the eye. *Colours*: greyish along the back, becoming yellowish-white on the sides and beneath; a black mark over the eye, and a few dull spots on the back.

Hab. Kashgar, Yankihissar, and Yarkand, up to 20 inches in length.

Dr. Scully collected four specimens in Kashgar (4043 feet above the sea), which are 13, 16, 17, and 18 inches respectively in length. Of specimens from the Yarkand collection which have found their way into the British Museum, one is 14 inches long, from Kashgar; the other 16 inches, from Yarkand.

3. SCHIZOTHORAX PUNCTATUS, sp. nov.

B. iv., D. $\frac{4}{8}$, P. 20, V. 11, A. $\frac{2}{5}$, C. 20.

Length of head $3\frac{3}{4}$ to 4, of caudal $5\frac{1}{2}$, height of body 6 to 7 in the total length. *Eyes*, diameter $6\frac{2}{3}$ in the length of head, $2\frac{1}{2}$ diameters from end of snout, and 2 apart. Interorbital space flat. The greatest width of the head exceeds its height by one fourth, and is $\frac{4}{9}$ of its length. Mouth anterior, with the upper jaw somewhat the longer; the cleft commencing opposite the middle of the eyes, whilst the maxilla reaches to below the front edge of the orbit. Lower labial fold interrupted in the middle. A thin striated horny covering to the lower jaw. *Barbels*: the maxillary ones equal the diameter of the eye; the rostral ones are slightly longer. *Fins*: dorsal rather higher than the body; it commences midway between the front edge of the eye and the base of the caudal fin; its last undivided ray is strong, coarsely serrated posteriorly, and as long as the postorbital portion of the head. Pectoral does not quite reach the ventral, which latter arises on a vertical line below the first articulated dorsal ray, and extends two thirds of the distance to the anal. Anal rather above twice as deep as its base is long; when laid flat it does not extend to the commencement of the caudal. Free portion of the tail one half longer than deep at its highest part. *Scales*: those along the lateral line larger than those above or below it. The tiled row along the base of the anal fin small, and equalling one third of the diameter of the orbit. *Colours*: silvery, covered with largish black spots.

Racoma nobilis, M'Clelland, has more fleshy lips, whilst the mouth appears more transverse, as in *Oreinus*, and the under jaw much the shorter.

Hab. Cashmere Lake.

4. SCHIZOTHORAX ESOCINUS.

Schizothorax esocinus, Heckel, Fische Kasch. p. 48, t. ix.; M'Clelland, Calc. Journ. Nat. Hist. ii. p. 579; Günther, Cat. vii. p. 166.

B. iv., D. $\frac{4}{8}$, P. 20, V. 10, A. 7, C. 20.

Length of head $4\frac{1}{4}$ to $4\frac{1}{2}$, of caudal $5\frac{3}{4}$, height of body $7\frac{1}{4}$ in the total length. *Eyes*: diameter $6\frac{1}{2}$ in the length of head, 2 diameters from end of snout and also apart. Interorbital space flat. The greatest width of the head equals its height or its postorbital length. Mouth very slightly oblique, horseshoe-shaped; the maxilla reaching to nearly below the front edge of the eye. Lower labial fold interrupted in the middle. A horny covering to inside of lower jaw.

Barbels: the rostral ones more than half longer than the eye, reaching to below its first third; the maxillary ones are slightly shorter. *Fins*: the dorsal as high as the body; it commences midway between the nostrils and the base of the caudal; its last undivided ray osseous, coarsely serrated posteriorly, and its bony portion being as long as the head, excluding the snout. Pectoral does not quite reach the ventral, which latter fin commences on a vertical line slightly behind the origin of the dorsal, and extends two thirds of the distance to the anal. Length of base of anal $\frac{3}{7}$ of its height; it reaches, when laid flat, to the base of the caudal, which latter fin is deeply forked. Free portion of the tail as high at its base as it is long. *Colours*: silvery, with numerous black spots most distinct in the upper half of the body.

Hab. Leh or Ladak, on the head-waters of the Indus, Cashmere, and Afghanistan.

5. SCHIZOTHORAX INTERMEDIUS.

Schizothorax intermedius, M'Clelland, Calc. Journ. Nat. Hist. ii. 1842, p. 579; Günther, Cat. vii. p. 165.

B. iv., D. $\frac{4}{7\text{–}8}$, P. 19, V. 10, A. $\frac{2}{6}$, C. 20, L. l. 105.

Length of head $4\frac{3}{4}$, of caudal 5 to 6, height of body 6 in the total length. *Eyes*: diameter $5\frac{1}{2}$ in the length of head, $1\frac{2}{3}$ diameter from the end of snout and also apart. Upper surface of the head flat; its greatest width equals its postorbital length, whilst its height equals its length excluding the snout. Upper jaw rather longer than the lower, and not overhung by the snout. Mouth horseshoe-shaped, the depth of the cleft equalling the width of its gape. The maxilla reaches to below the hind nostril. Lower labial fold interrupted in the middle. A thin, smooth, deciduous, horny covering to the lower jaw. *Barbels* four, as long as the eye in the young, longer in the adult. *Teeth* pharyngeal, 5, 3, 2 . 2, 3, 5, pointed and rather crooked at their summits. *Fins*: dorsal as high as the body in the young, not quite so high in the adult; it commences midway between the end of the snout or front nostril and base of the caudal; its last undivided ray strong, rather coarsely serrated posteriorly, one half to two thirds as long as the head in the immature, four fifths of its length in the adult. Pectoral as long as the head excluding the snout, and reaching more than halfway to the base of the ventral, which latter fin arises below the first dorsal ray and extends more than halfway to the anal. The length of the base of the anal equals half its height, which latter equals the length of the pectoral; if laid flat it almost reaches the base of the caudal, which is forked. *Scales*: depth of those in tiled row equals half a diameter of the eye. Free portion of the tail about as high at its commencement as it is long. *Colours* silvery, usually without spots; but in some specimens from Yankihissar there are minute black spots on the upper half of the body.

Hab. Kashgah, Yankihissar, and Sirikol. M'Clelland likewise obtained it (through Griffith) from Afghanistan, the Cabul river at

Jellalabad, and Tarnuck river. He sent three specimens to the East-India Museum.

6. Schizothorax microcephalus, sp. nov.

B. iv., D. $\frac{3}{9}$, P. 18, V. 11, A. $\frac{2}{5}$, C. 18, L. l. 105, L. t. 25/.

Length of head 5 to $5\frac{1}{2}$, of caudal 6, height of body $5\frac{3}{4}$ to 6 in the total length. *Eyes*: diameter 7 in the length of head, $2\frac{1}{4}$ diameters from end of snout, and $2\frac{1}{4}$ apart. Interorbital space flat. The greatest width of the head equals its length behind the middle of the eyes; its height equals its length excluding the snout. Mouth broad, anterior, with the upper jaw the longer, and overhung by the snout; the cleft of the mouth nearly horizontal, it extends to below the hind nostril, and is scarcely above half the extent of its gape; lower labial fold interrupted in the middle. A thin horny covering to the lower jaw. *Barbels*: the rostral ones reach to below the hind edge of the eye, the maxillary ones to the hind edge of the preopercle. *Fins*: dorsal anteriorly nearly as high as the body, commencing slightly nearer the snout than the base of the caudal fin, or midway between the two; its last undivided ray weak, articulated, and with some very small obsolete denticulations posteriorly about its centre (absent in some specimens). Pectoral as long as the head behind the front nostril, and reaching rather above halfway to the ventral, which latter is shorter than the pectoral, reaching about halfway to the base of the anal. Anal almost reaching base of caudal when laid flat, the length of its base being only one third of its height. Caudal with rounded lobes. Free portion of the tail rather longer than high. *Scales*: in the first third of the body those along the lateral line are larger than those above or below them, but posteriorly they are of the same size; the tiled row equal about half the diameter of the eye. *Colours* silvery.

M'Clelland says of *S. edeniana* that its spine is slender, soft, and denticulated at its base, but the reflected fold of the lower lip is uninterupted. *Racoma gobioides*, M'Clell., from the Bamean river, shows the head almost as short as in this species; but it has a strong serrated dorsal spine, whilst that fin is on an elevated base. The anal does not appear to reach above halfway to the base of the caudal.

Hab. The specimens are from Panja (9000 feet), the waters going to the Oxus. The dorsal spine approaches that of *Ptychobarbus*.

7. Schizothorax irregularis, sp. nov.

? *Schizothorax edeniana*, M'Clell. Calc. J. N. H. ii. p. 579.

B. iv., D. $\frac{3}{9}$, P. 18, V. 9, A. $\frac{2}{5}$, C. 20, L. l. 98, L. tr. 26/.

Length of head 5, of caudal 6, height of body 6 in the total length. *Eyes*: diameter $6\frac{1}{2}$ in the length of head, $2\frac{1}{2}$ diameters from the end of snout, and about 2 apart. Interorbital space nearly flat. The greatest width of the head equals its height or its length behind the orbit. Mouth narrow; the upper jaw slightly the longer, and only slightly overhung by the snout. Cleft of mouth a little oblique, its width equal to its length, and the maxilla reaching to beneath the front nostril. Lips very thick, lobed in the centre, and with an interrupted labial fold. *Barbels*: the rostral ones reach to below the front edge of the eye; the maxillary ones are one half longer than the diameter of the eye. *Fins*: dorsal anteriorly about two thirds as high as the body below it; its last undivided ray weak, very feebly serrated posteriorly, whilst the extent of its osseous portion does not exceed one third of the length of the head; the fin commences midway between the front edge of the eye and the base of the caudal fin. Pectoral as long as the head excluding the snout, and reaching halfway to the ventral, which latter is rather shorter and extends rather more than halfway to the base of the anal. Anal two fifths as long at its base as it is high, when laid flat it almost reaches the caudal, which latter is slightly forked. Free portion of the tail rather longer than high at its base. *Scales*: those behind the pectoral region to as far as the end of the anal, and below the lateral line, are much smaller than those above the lateral line. The tiled row small, not above half the diameter of the eye. *Colours*: silvery, becoming lightest and glossed with gold below the lateral line.

Hab. The specimen described is stuffed, and 20·5 inches in length. It was obtained as Tash-kurgan. If this is identical with *S. edeniana*, M'Clell., it is also found in the Cabul river, in the Mydan valley, and Sir-i-chusmah.

8. SCHIZOTHORAX NASUS.

Schizothorax nasus, Heckel, Fische Kasch. p. 33. t. vi.; Günther, Cat. vii. p. 166.

B. iv., D. $\frac{4}{8}$, P. 18, V. 10, A. $\frac{2}{5}$, C. 19, L. l. 90–100.

Length of head $4\frac{2}{3}$, of caudal $5\frac{1}{2}$, height of body 5 in the total length. *Eyes*: diameter $5\frac{1}{4}$ in the length of head, $1\frac{1}{2}$ diameter from the end of snout, and also apart. Dorsal profile more convex than that of the abdomen. Upper surface of the head nearly flat; its greatest width equals its postorbital length, while its height equals its length excluding the snout. Upper jaw rather longer than the lower and overhung by the snout. Mouth horseshoe-shaped, its gape equalling its cleft. The maxilla reaches to below the hind nostril. Lower labial fold interrupted. *Barbels* four; the maxillary ones two thirds as long as the eye; the rostral ones slightly shorter. *Fins*: dorsal as high as the body below it; it commences midway between the middle of the eye and the base of the caudal fin; its last undivided ray is strong, rather coarsely serrated, and nearly as long as the head. Pectoral about as long as the head excluding the snout, and reaching above halfway to the base of the ventral, which latter fin arises below the last undivided dorsal ray, reaching halfway to the base of the anal, which is above twice as high as wide at its base, and nearly reaches the caudal when laid flat. *Scales*: depth of those in the tiled row scarcely one third of the diameter of the eye. Free portion of the tail not quite so high at its commencement as it is long. *Colours*: silvery, with black spots on the upper half of the body.

This species has a more elevated dorsal profile and shorter barbels than *S. intermedius*.

Hab. Cashmere Lake.

9. PTYCHOBARBUS CONIROSTRIS.

Ptychobarbus conirostris, Steindachner, Verh. z.-b. Ges. Wien, 1866, p. 789, t. xvii. f. 4; Günther, Cat. vii. p. 169.

B. iv., D. $\frac{2}{8}$, P. 22, V. 10, A. 7–8, C. 19, L. l. 95, L. tr. 24/.

Length of head $4\frac{3}{4}$ to 5, of caudal $7\frac{1}{4}$, height of body $6\frac{1}{4}$ to $6\frac{3}{4}$ in the total length. *Eyes*: diameter from $4\frac{1}{4}$ to $5\frac{1}{4}$ in the length of the head, 2 diameters from the end of snout, and $1\frac{1}{4}$ apart. The greatest width of the head equals its postorbital length, but is slightly less than its height. Mouth horseshoe-shaped, with the upper jaw a little the longer, and rather overhung by the snout; the maxilla reaches to below the front edge of the eye. Lower labial fold very broad, uninterrupted, and with a cleft in the median line posteriorly. *Barbels*: a pair at the angle of the mouth, which reach the posterior edge of the preopercle; in a small specimen, 3·1 inches long, they only equal $\frac{1}{2}$ a diameter of the eye in extent. *Teeth*: pharyngeal ones in two rows. *Fins*: the dorsal commences much nearer the snout than the base of the caudal, its entire base being equidistant from these two points; it has no osseous ray, and is as high as the body below it. Pectoral as long as the head behind the nostrils, and does not reach quite so far as the ventral, which latter fin arises under the last few dorsal rays and reaches two thirds of the distance to the base of the anal. The anal, when laid flat, reaches the base of the caudal, its base is $2\frac{1}{3}$ in its height. *Scales*: the tiled row small, not one third of the diameter of the eye. *Colours*: silvery, darkest along the back and upper half of body, where most of the scales have black margins, thus causing small reticulations in the colour. Upper surface of the head spotted with black; some spots on the dorsal fin, and sometimes a few light ones on the caudal.

Hab. Head-waters of Indus, Hanli in Tibet, and Chiliscorus.

10. PTYCHOBARBUS LATICEPS, sp. nov.

B. iv., D. $\frac{4}{6}$, P. 18, V. 9, A. ?, C. 20, L. l. 145.

Length of head $4\frac{1}{4}$, of caudal $9\frac{1}{2}$, height of body 7 in the total length. *Eyes*: diameter 12 in the length of head, $2\frac{1}{2}$ diameters from the end of snout, and also apart. Mouth anterior, with the lower jaw somewhat the longer; the depth of the cleft of the mouth equals half the width of the gape. Upper surface of the head broad, its width being nearly twice its height. No lower labial fold under the mandible. *Barbels*: a maxillary pair as long as the eye. *Fins*: dorsal arises slightly nearer the base of the caudal than the end of the snout; its last undivided ray weak, articulated at its extremity, and not serrated. Pectoral two fifths as long as the head. Ventral arises below the anterior dorsal rays. Caudal forked. *Scales*: are scarcely imbricated, but cover the entire body; those forming the tiled sheath along the base of the anal fin are two thirds of the diameter of the eye. *Colours*: silvery superiorly, becoming dull white beneath; a few blackish spots along the back.

This interesting skin has unfortunately had its anal fin removed, whilst the pharyngeal teeth have not been preserved. The specimen is 52 inches in length.

It may be considered that as this fish differs from *P. conirostris* in the form of its mouth and snout, also in the position of the ventral fin, it might form a new genus; but we have yet much to learn of the mountain Barbels; perhaps a more extensive acquaintance will decrease the genera into which they are at present subdivided.

Hab. Kashgar (4043 feet elevation), the river from which place eventually joins the Yarkand river.

11. PTYCHOBARBUS LONGICEPS, sp. nov.

B. iv., D. $\frac{4}{8}$, P. 19, V. 12, A. $\frac{2}{5}$, C. 20, L. l. 112, L. tr. 31.

Length of head $3\frac{2}{3}$ to 4, of caudal 7 to $7\frac{1}{2}$, height of body $5\frac{1}{2}$ to 6 in the total length. *Eyes*: diameter 7 to 9 in the length of head, $1\frac{1}{2}$ diameter from the end of snout, and 2 apart. Mouth anterior, cleft oblique, commencing superiorly opposite the upper margin of the eye. Lower jaw somewhat the longer; the maxilla reaches to below the middle of the eye. The greatest width of the head rather exceeds its height, and equals half its length. Interorbital space flat. No lower labial fold under the mandibles. *Barbels*: a maxillary pair half as long as the eye. *Fins*: the dorsal commences midway between the hind edge of the preopercle and the base of the caudal fin. Its last undivided ray is osseous, of moderate strength, and very finely serrated posteriorly; its osseous portion equals a little above one fourth of the length of the head. Pectoral half as long as the head, and reaches halfway to the ventral; the latter fin commences under the first divided dorsal ray, and does not extend quite halfway to the root of the anal. Anal twice as high as its base is long; it does not reach the caudal when laid flat; the latter fin forked. *Scales* oval, nearly as wide as high and slightly imbricate; the tiled row half the diameter of the eye. Free portion of the tail rather longer than high. *Colours*: bluish on the back, lightest below, dorsal and caudal spotted.

Hab. Yarkand, whence the stuffed specimen described was brought. It is 31 inches in length. This species scarcely accords with the definition of *Ptychobarbus*, the last undivided dorsal ray being osseous and finely serrated; but the specimen is large, whilst *P. laticeps* forms the intermediate form between it and *P. conirostris*.

12. SCHIZOPYGOPSIS STOLICZKÆ.

Schizopygopsis stolickæ, Steind. Verh. z.-b. Ges. Wien, 1866, p. 785; Günther, Cat. vii. p. 170.

B. iv., D. $\frac{3-4}{7-8}$, P. 13, V. 11, A. $\frac{2}{5-6}$, C. 19.

Length of head 5 to $5\frac{3}{4}$, of caudal $5\frac{1}{2}$ to $5\frac{3}{4}$, height of body 7 to 8 in the total length. *Eyes*: diameter 4 to 5 in the length of head, 1 to $1\frac{1}{2}$ diameter from end of snout, and $1\frac{1}{2}$ to 2 apart. The greatest width of the head equals its length behind the middle of the eyes; and its height equals its length excluding the snout. Mouth inferior, overhung by the snout; the maxilla reaches to below the front edge of the eye. A sharp, anterior, horny edge to the mandible. *Barbels* absent. *Fins*: the dorsal commences about midway between the end of the snout and the root of the caudal; its upper edge is nearly straight, oblique; the fin is as high as the body below it, and one third higher than its base is long; its last undivided ray osseous and finely serrated posteriorly. Pectoral not quite so long as the head, and reaching rather above halfway to the ventral, which latter, arising below the middle of the dorsal, is slightly the shorter, and does not reach the anal. Anal, when laid flat, reaches the base of the caudal; it is rather above twice as high as its base is long. Caudal deeply forked. Free portion of the tail as high as long. *Lateral line*: at first descends gently, and, then reascending, attains the middle of the body opposite the posterior extremity of the dorsal fin. *Colours*: olive superiorly, becoming white on the sides and beneath; the whole covered with irregular blackish spots.

The ova are comparatively large. The serrated dorsal spine is strongest in specimens from Leh.

These fishes appear to be much attacked by parasites, which occasion yellowish elevated tubercles, not only on the head and body, but also on the dorsal fin.

One specimen, from Balachi, had a shot (No. 2) imbedded in the isthmus, where the parts around it had healed.

Hab. Leh or Ladak, Tanksē, and fry or small ones from Lukung and Chagra (15,090 feet), all being waters directly or indirectly going to the Indus. Some fry from Sirikol, the waters of which go to the Yarkand river*, Aktash, Upper Kara-kul and Panjah, tributaries of the Oxus or Amu river. It has also been taken at Guari khorsum by Schlagintweit. Largest specimen 8·5 inches in length. There is also a specimen from Balachi, the streams there being apparently flowing towards the Yarkand river, which goes to the east.

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* I am very dubious of these specimens, and hardly think they can have been obtained from waters that flow into the Yarkand river, as the adults have not been obtained thence. The adult, however, has been taken in the Oxus; and I find by the diary that on the day the specimens in question were captured the camp was at Sirikol, a few miles from a valley where a stream enters the Aksu river, a tributary of the Oxus.

13. DIPTYCHUS MACULATUS.

Diptychus maculatus, Steindachner, Verh. z.-b. Ges. Wien, 1866, p. 787; Günther, Cat. vii. p. 171.

? *Diptychus sewerzowi*, Kessler, Fish. Turkestan, p. 17, t. 4. f. 12.

B. iv., D. $\frac{2-3}{8-9}$, P. 19, V. 9, A. $\frac{2}{5}$, C. 19, L. l. 80–90.

Length of head 5 to 6, of caudal 5 to 6, height of body $7\frac{1}{2}$ to 8 in the total length. *Eyes*: diameter $4\frac{1}{2}$ in the young to 6 in the adult in the length of the head, $1\frac{1}{4}$ to 2 diameters from the end of snout, and $1\frac{1}{2}$ apart. The greatest width of the head equals its height, or its length behind the front edge or middle of the eyes. Mouth transverse, inferior, having an anterior sharp horny covering on the lower jaw. Lower labial fold interrupted in the middle. *Barbels*: one at each maxilla, having thick bases, and hardly so long as the eye. *Teeth* pharyngeal, 4, 3 . 3, 4, curved at the outer extremity and pointed. *Fins*: the dorsal commences rather nearer the snout than the base of the caudal, its upper edge is straight, it is as high as the body below it, its last undivided ray articulated. Pectoral not quite so long as the head; it reaches rather above halfway to the ventral, which latter commences on a vertical line below the last dorsal ray; it reaches rather above halfway to the base of the anal. Anal when laid flat reaches the base of the caudal, its height is nearly three times the length of its base. *Scales*: not imbricated, but scattered over the upper two thirds of the body and pectoral region, in which latter locality the skin is often rugose: the tiled row well developed. Free portion of the tail one half longer than high at its base. *Colours*: bluish, lightest inferiorly, indistinctly blotched and spotted along the upper half of the body, often a narrow, dull band along the lateral line, and a second below it. The dorsal and caudal much spotted in some specimens.

The very young are destitute of scales; they first appear along the lateral line. One specimen from Basgo, 1·1 inch long, has no barbel on the left side. There are two specimens from the west of Sirikol: one has an adipose lid, covering the anterior half of the left eye; the other has a similar lid covering the lower half of the left eye. Brown tubercles are common on some of the specimens, and do not appear to be normal. Some specimens from Leh have the eye small.

Diptychus sewerzowi, from the rivers Aksai and Ottuck appears to be the above species.

Hab. Specimens were brought from Kurbu, Basgo, Sneema, Leh or Ladak, Tanksē, and Chagra, from waters going directly or indirectly to the Indus; from Pas Robat (9370 feet), and Tarbashi (11,515 feet), where the waters go to the Yarkand river; also from west of Sirikol, which goes to the same river. Some specimens are also labelled as from Chiriscorus.

This fish has also been captured in other parts of Tibet, and likewise in Nepal.

14. CIRRHINA GOHAMA.

Cyprinus gohama, Ham. Buch. Fish. Ganges, pp. 346, 393.
Barbus diplochilus, Heckel, Fisch. Kasch. p. 53, t. 10. f. 1.
Tylognathus barbatulus, Heckel, Hügel's Reise, iv. p. 376.
Gonorhynchus brevis, M'Clell. Ind. Cypr. p. 373, t. 43. f. 6.
Crossocheilus gohama, Bleeker, Prod. Cypr. p. 110; Günther, Cat. vii. p. 72.
Crossocheilus rostratus, Günther, *l. c.*
Crossocheilus barbatulus, Günther, *l. c.*

B. iv., D. $\frac{3}{7-8}$, P. 15, V. 9, A. $\frac{2}{5}$, C. 19, L. l. 38-40.

There are several specimens of this fish from the lake in Cashmere; and, curiously enough, they show the links between H. B. and Heckel's species. All have a pair of rostral barbels and minute mandibular ones (*C. barbatula*). Some have 5½, some 4½ rows between the lateral line and base of first dorsal ray. Others possess 3, 3½, and 4½ rows between the lateral line and base of ventral fin. The proportions likewise vary with age and other causes.

The localities this fish inhabits, and its mode of frequenting stones, very much resemble those of *Discognathus lamta*, H.B., whilst its jaws are wide (not deep); and its under surface is similarly flattened, but it has no labial sucker.

Before describing the Loaches, I will give my reasons why it appears to me that genus *Diplophysa*, Kessler, may probably be a synonym of *Nemacheilus*.

It is said to consist of "elongated fishes, strongly compressed posteriorly," which we perceive in *Nemacheilus stoliczkæ* and *N. yarkandensis*; but in an equally elongated species, *N. tenuis*, the free portion of the tail is not compressed, but as wide as deep.

"The eyes are surrounded with a fold of skin forming a lid." This is also perceived in specimens amongst the species I have enumerated from Yarkand; and I have likewise noted that some of the other fishes from the same cold region have folds of skin more or less covering the eyes.

"Lips fleshy, the upper more or less denticulated, the inferior bilobed, and more or less papillated." I have figured the inferior surface of the head of all the Loaches; and although some, as *N. stoliczkæ* and *N. tenuis*, have the lips as described by Kessler, the *N. yarkandensis* has not, whilst the three certainly cannot be separated into distinct genera.

"Air-vessel in two parts, the anterior enclosed in a bony capsule, the posterior elongated and free in the abdominal cavity." This is the only portion of Kessler's definition not perceived in my fish; the air-vessel in all is enclosed in bone; and I cannot resist suggesting a reexamination of Western Turkestan specimens. It would be very remarkable were the *Nemacheili* found in Europe, in fact throughout Asia, even in the Oxus, to have their air-vessels enclosed in bone, whereas in the river Ili going to Lake Balkash, and the river Urdjar falling into Lake Ala (Ala kul), they have the same organ partially free in the abdomen, as is seen in genus *Botia*. But granting Kessler's description to be accurate, I cannot think that such a fact alone would justify instituting a new genus for the reception of his species.

The reason for air-vessels being enclosed in bone in some fishes is very obscure; and I sometime since adverted, in the 'Proceedings' of this Society, to the circumstance of such not being infrequent in Indian *Siluridæ*.

I found amongst the Indian genera of Siluroids of the fresh waters, or those which entered fresh waters, as follows:—

A. *Air-vessel free in the abdominal cavity.*

1. *Rita*; 2. *Erethistes*; 3. *Pseudeutropius*; 4. *Silurus*; 5. *Olyra*; 6. *Macrones*; 7. *Callichrous*; 8. *Wallago*; 9. *Arius*; 10. *Hemipimelodus**; 11. *Osteogeniosus*; 12. *Batrachocephalus*; 13. *Pangasius*; 14. *Plotosus*. Of these, five (no. 9, 10, 11, 12, and 14) are marine forms, entering fresh waters for predaceous purposes.

B. *Air-vessel more or less enclosed in bone.*

1. *Ailia*; 2. *Ailiichthys*; 3. *Sisor*; 4. *Bagarius*; 5. *Amblyceps*; 6. *Saccobranchus*; 7. *Silundia*; 8. *Eutropiichthys*; 9. *Gagata*; 10. *Pseudecheneis*; 11. *Exostoma*; 12. *Clarias*; 13. *Glyptosternum*. All of these are freshwater genera.

Thus the necessity for the air-vessel being enclosed in bone appears to be restricted to the fishes of fresh waters of the plains or hills.

These thirteen freshwater genera having the air-vessel enclosed in bone are divisible as follows:—

1. Waters of plains.
   - α. Large rivers: no suckers on the chest. *Ailia, Ailiichthys, Sisor, Bagarius, Silundia, Eutropiichthys, Gagata.*
   - β. Large rivers: descending to the sea. An accessory air-breathing apparatus. *Clarias.*
   - γ. Smaller rivers, tanks, &c. An accessory air-breathing sac. *Saccobranchus.*
2. Waters of the plains or hills.
   - No sucker on chest. *Amblyceps.*
   - Sucker on chest. *Glyptosternum.*
3. Waters of hills.
   - Sucker on chest. *Pseudecheneis.*
   - Chest adhesive. *Exostoma.*

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* I erroneously gave the air-vessel as enclosed in bone in *Hemipimelodus*. The genus was defined by Bleeker; and it was suggested that *Pimelodus cenia*, H. B., was an example. Not having an estuary or marine species, as *H. jatius*, by me, I took *P. cenia*, H. B., as one of the genus; whereas I now find that it belongs to *Gagata*, which embraces *P. cenia*, *P. viridescens*, *P. itchkeea*, and two or three other species. *Pimelodus jatius*, H. B., *has no palatine teeth*, as stated in the 'Fishes of the Ganges;' it is a *Hemipimelodus*, Bleeker; and of it I possess specimens from the Hooghly; but I consider such as probably only a variety of *Arius*.

As we find genera with the air-vessel enclosed in bone decrease in number the further we are from Hindustan proper, it is but natural to conclude that the necessity for this bony capsule is greater in India than in other tropical countries, and also that it is only useful for freshwater forms.

When we see that all fishes (except the *Nemacheili*) from Yarkand have the air-vessel free in the abdominal cavity, it stands to reason that heat or cold can scarcely be that which causes its necessity.

It is certainly remarkable that Siluroid forms do not appear to thrive in cold climates; whereas the *Cyprininæ* of this collection have all small scales, or are more or less destitute of any; whilst the Loaches of Yarkand and Tibet have none at all, neither have those recorded from the Oxus or the Jaxartes.

There is one characteristic of the hill-Loaches which seems almost invariable: the pectoral fins are stiff at their bases, as if employed for adhesive purposes. I have observed the outer ray in some of the Loaches of the plains forming a distinct bony ray with an enlarged and flattened outer extremity; but this is used for the purpose of assisting them to dig into the sand, in which they will bury themselves with great rapidity on the approach of danger.

15. NEMACHEILUS STOLICZKÆ.

Cobitis stoliczkæ, Steindachner, Verh. z.-b. Ges. Wien, 1866, p. 793, t. xiv. f. 2.

Cobitis tenuicauda, Steind. *l. c.* p. 792, t. xvii. f. 3.

Nemacheilus stoliczkæ, Günther, Cat. vii. p. 360.

Nemacheilus tenuicauda, Günther, *l. c.* p. 357.

B. iv., D. $\frac{2}{7}$, P. 13, V. 8, A. $\frac{2}{5}$, C. 15.

Length of head 6, of caudal 6, height of body 8 in the total length. *Eyes*: diameter 8 in the length of head, 3 diameters from the end of snout, and 2 apart. Snout rounded, slightly projecting over the mouth. Lips rugose; and in some specimens from Yarkand the edges are fimbriated: lower lip with a lobe on either side, but the lower labial fold interrupted in the middle. The greatest width of the head equals its height, or its length excluding the snout. In some specimens the preorbital has a free lower edge. *Barbels* six; the maxillary ones reach beyond the hind edge of the eye; the rostral ones are shorter. *Fins*: the dorsal commences midway between the eye and the base of the caudal, it is one third higher than its base is long, and equals the greatest depth of the body; its last ray is divided to its base; its upper edge is oblique, with a rounded anterior angle. Pectoral nearly as long as the head, and reaching rather above halfway to the ventral; the latter fin arises on a vertical line below the anterior dorsal rays, is almost as long as the pectoral, and reaches above halfway to the anal. Anal with a very narrow base. Caudal slightly emarginate. Free portion of the tail from twice to two and a half times as long as high at its base. *Scales* absent. *Air-vessel* in two portions, enclosed in bone.

Colours: greyish along the back, becoming lighter beneath, marbled all over with dark green or black spots or bands. Dorsal, caudal, and sometimes outer pectoral rays barred.

In specimens from Sirikol the snout is rather more pointed than described above.

Hab. Leh or Ladak (11,538 feet); Sneema, Lukung stream (14,130 feet); and Chagra (15,000 feet), all being waters directly or indirectly going to the Indus. Also Yarkand (3923 feet) and Sirikol, where the waters go to the easterly or Yarkand river; and Aktash (12,600 feet), which is on the Aksi, a tributary of the Oxus.

I have a specimen in my collection given me by Dr. Stoliczka; he procured it, along with those sent to Steindachner, from Lake Tsumureri in Rupshu (Tibet), on his first visit to that country.

16. NEMACHEILUS YARKANDENSIS, sp. nov.

B. iv., D. $\frac{2}{7}$, P. 17, V. 8, A. $\frac{2}{5}$, C. 15.

Length of head $4\frac{1}{3}$, of caudal 6, height of body $6\frac{3}{4}$ in the total length. *Eyes*: diameter 6 to 7 in the length of the head, $2\frac{1}{2}$ diameters from the end of snout, and 2 to 3 apart. Snout rather elevated in the adult: upper surface of the head nearly flat; its greatest width equals its height or its length excluding the snout. Mouth inferior, horseshoe-shaped; lips smooth, lower labial fold interrupted in the middle and destitute of lobes. *Barbels* six; the maxillary ones reach (in adults) the angle of the preopercle. *Fins*: the dorsal commences midway between the front edge of the eye and the base of the caudal fin; its upper edge is straight and oblique; its height rather exceeds that of the body below it, and is one fourth more than the extent of its base. Pectoral as long as the head excluding the snout, and reaching two thirds of the distance to the ventral. Ventral commences below the first dorsal ray, is shorter than the pectoral, and reaches two thirds of the distance to the anal. Anal twice as high as wide at its base. Caudal emarginate, its outer rays being a little produced. Free portion of the tail at its commencement nearly equals its length in the adult, but is less in the young. *Scales* absent. *Air-vessel* in two portions, enclosed in bone. *Colours*: greyish, having in some specimens numerous fine blackish or dark spots on the body. In some there is a silvery lateral band.

Hab. Yarkand, Pas Robat, Yankihissar, and Kashgar, all from waters in connexion with the Yarkand and Yankihissar or Great Easterly River.

17. NEMACHEILUS TENUIS, sp. nov.

B. iv., D. $\frac{2}{8\text{-}9}$, P. 13, V. 8, A. $\frac{2}{5}$, C. 17.

Length of head $5\frac{1}{3}$ to $5\frac{1}{2}$, of caudal $7\frac{1}{2}$, height of body 9 to 10 in the total length. *Eyes*: diameter $5\frac{1}{2}$ in the length of head, $2\frac{1}{4}$ diameters from the end of snout, and 1 apart. Snout rather compressed and overhanging the mouth; the greatest width of the head equals its height or its length excluding the snout. In some specimens the lower edge of the preorbital is free. Lips thickened and fimbriated in the adult; lower labial fold interrupted in the middle, and rather lobed on either side. *Barbels* six; the outer rostral pair extend to below the hind edge of the eye, the maxillary ones to the opercle in the adult. *Fins*: dorsal commences midway between the end of the snout and the base of the caudal fin; its upper edge is slightly concave, with a rounded upper angle; it is rather more than one half higher than the extent of its base or than the body below it. Pectoral nearly as long as the head, and reaches rather above halfway to the ventral, which latter commences under the third dorsal ray; is as long as the pectoral, and reaches the base of the anal. Anal twice as high as wide at its base. Caudal slightly emarginate. Free portion of the tail one third as high at its base as it is long, whilst its breadth equals its height. *Scales* absent. *Air-vessel* in two portions, enclosed in bone. *Colours*: yellowish white, its upper surface and sides sometimes with dark blotches and spots; dorsal and caudal with dull spots.

This fish is allied to *N. ladacensis*, Günther, but is distinguished by a more elongated body and longer barbels &c.

Hab. Aktash (12,600 feet elevation), where the waters of the Ak-su pass to the Oxus; and Yankihissar (4320 feet elevation), where the rivers go to the Yarkand river.

18. NEMACHEILUS LADACENSIS.

Nemacheilus ladacensis, Günther, Cat. vii. p. 356.

B. iv., D. $\frac{2}{8}$, P. 13, V. 9, A. $\frac{2}{6}$, C. 19.

Length of head 5, of caudal $5\frac{3}{4}$, height of body $5\frac{1}{2}$ in the total length. *Eyes*: diameter 5 to $5\frac{1}{2}$ in the length of head, $2\frac{1}{2}$ diameters from end of snout, and 2 apart. Greatest width of head equals its height or its length excluding the snout. Lips moderately thick and rugose; lower labial fold interrupted in the middle. *Barbels* six; the maxillary ones scarcely reach to below the front edge of the eye, the longest rostral ones to below the front nostril. *Fins*: dorsal commences midway between the front edge of the eye and the base of the caudal fin; it is as high as the body below it and half higher than its base is long; its upper anterior corner rounded. Pectoral as long as the head behind the angle of the mouth, and reaching nearly to the ventral, which latter fin arises below the commencement of the dorsal fin; it is shorter than the pectoral, but extends to the base of the anal. Anal twice as high as long, and reaches above halfway to the base of the caudal, which is emarginate. Free portion of the tail twice as long as high at its base. *Scales* absent. *Colours*: of a light fawn, with sixteen or eighteen interrupted darker and sinuous bands passing from the back down the sides; a silvery lateral band. Dorsal and caudal finely spotted in lines; a darkish band on pectoral, ventral, and anal.

Hab. Gnari Khorsum, Tibet. The specimen described is the largest of two obtained by Messrs. v. Schlaginweit, and deposited in the Indian Museum. The size of the British-Museum specimen, and the broken state of its caudal fin, must be accepted as the reason why my proportion of the free portion of the tail does not agree with Dr. Günther's (nearly $\frac{1}{4}$); whilst I find the caudal fin emarginate, and not "rounded."

19. NEMACHEILUS GRACILIS, sp. nov.

B. iv., D. $\frac{2}{7}$, P. 13, V. 8, A. $\frac{2}{6}$, C. 17.

Length of head $5\frac{1}{2}$, of caudal $6\frac{1}{3}$, height of body $6\frac{1}{3}$ in the total length. *Eyes*: diameter 11 in length of head, 4 diameters from end of snout, and $2\frac{1}{2}$ apart. Snout overhanging the mouth. The greatest width of the head equals its height or its length excluding the snout. Lips thickened; lower labial fold interrupted in the middle and rather lobed on either side. *Barbels* six; the maxillary ones nearly twice as long as the eye; the external rostral ones reach the hind nostril; the other pair are shorter. *Fins*: dorsal commences midway between the eye and vertical border of the preopercle; its upper edge is nearly straight; it is not quite so high as the body below it, and one fourth less than the extent of its base. Pectoral as long as the head behind the angle of the mouth; it reaches rather above halfway to the base of the ventral, which latter fin arises somewhat in advance of the commencement of the dorsal; it is of about the same length as the pectoral, and extends halfway to the anal. Anal twice as high as wide at its base; it reaches, when laid flat, a little more than halfway to the base of the caudal, which is slightly emarginate. Free portion of the tail half as high at its base as it is long. *Scales* absent. *Colours*: brownish along the back, becoming yellowish beneath; dorsal and caudal with dull spots.

Hab. Basgo, on the head-waters of the Indus.

20. NEMACHEILUS MARMORATUS.

Cobitis marmorata, Heckel, Fische Kasch. p. 76, t. xii. figs. 1 & 2; Hügel, Kaschm. iv. p. 380.

Cobitis vittata, Heckel, *l. c.* p. 80, t. xii. figs. 3 & 4; Hügel, *l. c.* p. 382.

Nemachilus marmoratus, Günther, Cat. vii. p. 356.

B. iv., D. $\frac{2}{7}$, P. 11, V. 7, A. $\frac{2}{5}$, C. 17.

Length of head $4\frac{3}{4}$ to 5, of caudal 7, height of body 7 in the total length. *Eyes*: diameter 5 in length of head, 2 diameters from end of snout, and $1\frac{1}{2}$ apart. Snout somewhat pointed; and in some the preorbital is slightly projecting. Lips wrinkled; the lower labial fold interrupted. The greatest width of the head equals its height or its length excluding the snout. *Barbels*: the maxillary ones reach to below the hind edge of the eye; the rostral ones are nearly as long. *Fins*: dorsal commences midway between the end of the snout and the base of the caudal; its upper edge is nearly straight, oblique, and with rounded angles; its height rather exceeds that of the body below it; and it is nearly twice as high as its base is long. Pectoral as long as the head excluding the snout, and extending halfway to the ventral. Ventral one third shorter than the pectoral, and reaching halfway to the anal. Anal twice as high as long at its base. Caudal cut square, with rounded angles or slightly emarginate. Free portion of the tail from one and a half to twice as long as high at its base. *Scales* absent. *Colours*: marbled or irregularly blotched and spotted with brown; fins also more or less spotted.

Hab. Cashmere Lake.

21. NEMACHEILUS RUPICOLA.

Schistura rupicola, M'Clelland, Journ. Asiat. Soc. of Beng. vii. pl. 55. fig. 3, and Ind. Cypr. p. 309, pl. 57. f. 3.

The Cashmere species are almost or quite destitute of scales, and otherwise agree with M'Clelland's fish.

It may, however, be questionable whether *N. montana*, M'Clelland, and some other recognized species are not merely varieties of one form, as the variations in one locality and also changes with age are very great.

NEMACHEILUS MICROPS*.

Cobitis microps, Steind. Verh. z.-b. Ges. Wien, 1866, p. 794, t. xiii. f. 3.

Nemacheilus microps, Günther, Cat. vii. p. 357.

This species is entirely destitute of scales. It was obtained by Dr. Stoliczka in Tibet, on his first journey; but no specimens exist amongst the Yarkand collection.

If we examine the localities whence the fishes which form this collection were procured, omitting the Cashmere examples, we find as follows:—

Name of species.	Head-waters of Indus.	Yarkand river, or its branches.	Oxus, or its tributaries.
Exostoma stoliczkæ	1		
Oreinus sinuatus	1		
Schizothorax esocinus	1		
—— *chrysochlorus*	...	1	
—— *intermedius*	...	1	1
—— *irregularis*	...	1	
Ptychobarbus conirostris	1		
—— *laticeps*	...	1	
—— *longiceps*	...	1	
Schizopygopsis stoliczkæ	1	...	1
Diptychus maculatus	1	1	
Nemacheilus stoliczkæ	1	1	1
—— *gracilis*	1		
—— *yarkandensis*	...	1	
—— *tenuis*	...	1	1
Totals	8	9	4

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* *Oreias dabryi*, Sauvage, Rev. et Mag. Zool. 1874, p. 3, is closely allied to this species.

Thus we have:—eight species from the head-waters of the *Indus*, two of which extend to the Great Easterly or Yarkand river of Eastern Turkestan, and one to the Oxus of Western Turkestan; nine species from the *Yarkand river*, two common to the Indus and three to the Oxus; four species from the *Oxus*, three of which are also found in the Yarkand river, and one in the head-waters of the Indus.

The foregoing species constitute the fish-collection made in the cold and inhospitable regions traversed by the Mission; and they are of interest for the purpose of ascertaining what are the chief characteristics of the fish-fauna, and what relationship it bears to those of contiguous Asiatic regions, so far as such have been ascertained.

In this inquiry it will be necessary to take a survey of the fishes of Afghanistan, Western Turkestan, and Hindustan, before proceeding further respecting those of Tibet and Yarkand or Eastern Turkestan.

Most of our knowledge of the Fishes of Afghanistan is due to the labours of Griffith, who remarked:—"The characteristic forms of Afghan fish are doubtless the small-scaled *Barbi* and *Oreini*; and these far exceed the others in number . . . . The fish are as distinct from the Indian forms as the plants are . . . . By characteristic I do not mean that these forms are limited to Afghanistan, because they occur perhaps to an equal extent in the Himalayas, to the streams of which those of Afghanistan approximate more or less in the common features of rapids and bouldery beds."

Having crossed the high range of mountains separating Afghanistan from the plains of Western Turkestan, he found "a great change in the fish to occur, and *Salmonidæ* seem to take the precedence of the *Cyprinidæ*. A species of Trout abounds in the Bamean river and up its small tributaries, derived from the Koh-i-Baba, to an altitude of about 11,000 feet. A species of *Barbus* with small scales is likewise common in the Bamean river" (Calc. Journ. Nat. Hist. ii. p. 565).

He observes that Indian species were in the majority in the Cabul river (a tributary of the Indus) at Peshawur; and in accordance with the facility or the reverse of access from the plains did he find a predominance of Indian or Afghan forms *.

The nature of the fishes of Afghanistan appears to be much as follows:—Absence of Acanthopterygian or spiny-rayed families, except the spineless and widely distributed *Ophiocephalus gachua*, Ham. Buch., and the spined eel, *Mastacembelus armatus*, Lacép., so common in the East from the plains to the summits of mountains. Few Siluroids, but perhaps a *Callichrous* and *Amblyceps*. Numerous Cyprinoids which appear to belong to the following genera—*Orei-*

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* Griffith states that the Cabul river at Jellalabad presents us with two or three small-scaled *Barbi* (? *Schizothorax*) and *Oreini*, together with certain tropical forms, as the Mahasir (*Barbus*) and a *Silurus* very like, if not identical with, the Poftah (*Callichrous*). Also the same river at Lalpore possesses a fish, I believe, identical with the Nepoora of Assam (*Labeo*), and a *Gonorrhynchus* (=*Discognathus*). Griffith also mentions a Loach-like *Silurus* from near Jubraiz (? *Amblyceps*).

nus, *Schizothorax*, *Bungia* from near Herat, *Barilius*, and a Loach (? *Nemacheilus*), perhaps *Discognathus* and *Barbus*.

The fullest account we possess of the fishes of Western Turkestan is that lately given by Kessler, from which I have extracted the following :—

ACANTHOPTERYGII. *Perca fluviatilis*, Linn., obtained exclusively from the Jaxartes and some of its tributaries. *P. schrenckii*, Kess., from Lake Balkash. *Lucioperca sandra*, Cuv., from the Jaxartes. *Cottus spinulosus*, Kess., very rare in Turkestan, two specimens from Khojend.

None of these spiny-rayed fishes were captured at so south a latitude as Kashgar. Out of the four species three came from the Jaxartes or its tributaries, the other from lake Balkash.

SILURIDÆ. *Siluris glanis*, Linn. Generally spread throughout Western Turkestan, having been received from the Jaxartes, Oxus, and Sarekshan or Tarafshan rivers.

CYPRINIDÆ. *Cyprinus carpio*, Linn., from the Jaxartes, Oxus, Sarekshan rivers. *Barbus conocephalus*, Kess., from Sarekshan. *B. platyrostris*, Kess., from the river Aksu falling into lake Balkash. *B. lacertoides*, Kess., from Jaxartes and its tributaries. *B. brachycephalus*, Kess., from Jaxartes and Oxus. *Schizothorax aksaiensis*, from the river Aksai. *S. fedtschenkoi*, Kess., *S. affinis*, Kess., and *S. eurystomus*, Kess., from the Sarekshan river. *S. orientalis*, Kess., from a lake on the Alatau mountains, the waters on the Western Turkestan side of which drain to Lake Balkash. *Diptychus severzowi*, Kess., Aksai and Ottuk rivers to 10,000′. *D. dybowskii*, Kess., river Aksu. *Gobio fluviatilis*, Cuv., widely distributed in Western Turkestan, specimens received from near the towns of Tachkent, Khojend, Djisak, and the river Ak Daria. *Abramis brama*, Linn., Jaxartes and its tributaries. *A. sapa*, Pallas, rare, from the Jaxartes. *Acanthobrama kuschakewitschi*, Kess., Jaxartes. *Pelecus cultratus*, Linn., Sea of Aral. *Abramis chalcoides*, Güld., rather rare, obtained in the Ak Daria and Durman cul. *A. iblioides*, Kess., creeks near Jani curjan. *A. fasciatus*, Nord., Sarekshan. *A. tæniatus*, Kess., Jaxartes. *Aspius rapax*, Pallas, Jaxartes and its tributaries. *A. esocinus*, Kess., Jaxartes and Oxus. *Leuciscus erythrophthalmus*, Linn., Jaxartes. *L. squaliusculus*, Kess., from near Khojend on the Jaxartes and Janykurjan. *L. rutilus*, Linn., Jaxartes and Aigus Lake.

COBITIDINÆ. *Cobitis longicauda*, Kess. (scaled), one specimen from the Jaxartes. *C. uranoscopus*, Kess., from near Magian, Tashkend, Hhodjaduk, and Lake Iskander, the waters of which appear to drain to the Sarekshan river. *C. dorsalis*, Kess., creeks near Janykurjan. *C. elegans*, Kess., and *C. tænia*, Kess., river near Tashkend, a tributary of the Jaxartes. *Diplophysa strauchii*, Kess., river Ili, falling into Lake Balkash. *D. labiata*, Kess., river Urdjar, falling into Lake Alakul.

SALMONIDÆ. *Salmo oxianus*, Kess., river Darant, falling into the Kisil-su, one of the upper tributaries of the Oxus.

ESOCIDÆ. *Esox lucius*, Linn., Jaxartes and its tributaries.

CHONDROPTERYGII. *Acipenser schipa*, Lovetsky, Jaxartes, Casalius river. *Scaphirhynchus fedtschenkoi*, Kess., Oxus.

The foregoing fishes of Western Turkestan * mainly consist of, first, those descending from the north or spreading from the east or west, such as *Perca*, *Lucioperca*, *Cottus*, *Gobio*, *Abramis*, *Acanthobrama*, *Pelecus*, *Alburnus*, *Aspius*, *Squalius*, *Leuciscus*, *Acipenser*, and *Scaphirhynchus*.

Secondly, those common to Afghanistan and Yarkand, as *Schizothorax*, *Barbus*, Loaches (? genus).

Thirdly, those found also in Yarkand, as *Schizothorax* and *Diptychus*.

Fourthly, *Silurus* (which will be alluded to).

Lastly, *Salmo*, on the slopes of the mountains where the rivers descend to the Oxus.

The existence of one of the Salmonidæ, termed *Salmo orientalis* by M'Clelland, was well known to Dr. Stoliczka; and an especial object of his search (as he informed me previous to starting) would be to try and ascertain what its distribution was. Griffith found this fish "in the Bamean river, a stream that falls from the northern declivities of the Hindoo Koosh into the Oxus."

Kessler does not record any of this family from the Jaxartes, or, in fact, from the rivers immediately descending from the Tian Shan or the Alatau Mountains. We are therefore left to surmise that in the hills whence these fishes were taken is the abrupt termination of members of the family Salmonidæ, which does not possess a solitary representative in Hindustan, except the *S. levenensis* (introduced on the Neilgherries in Madras).

If we now take a short review of the *Freshwater Fishes of India*, we find much as follows:—

ACANTHOPTERYGII.

Genera *Ambassis*, *Badis*, *Nandus*, *Pristolepis*, *Sciæna*, *Gobius* and some allied genera, *Rhynchobdella*, *Mugil*, *Anabas*, *Polyacanthus*, *Osphromenus*, *Trichogaster*, *Etroplus* exist in India, but are absent from the fresh waters of Afghanistan, Turkestan and Yarkand. Whether existing only in large rivers or distributed more generally over India, none pass the boundary of the Himalayas.

Mastacembelus and *Ophiocephalus* are found in India and also in Afghanistan; both also ascend for some height the Himalayas and other hill-ranges.

PHYSOSTOMI.

SILURIDÆ. Genera *Erethistes*, *Macrones*, *Rita*, *Pangasius*, *Pseud-*

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* I have to thank Mr. F. Carl Craemers for kindly translating some Russian localities, which I should not otherwise have been able to give.

eutropius, *Wallago*, *Olyra*, *Chaca*, *Clarias*, *Saccobranchus*, *Silundia*, *Ailia*, *Ailiichthys*, *Eutropiichthys*, *Sisor*, *Gagata*, *Bagarius*, *Pseudecheneis*, *Glyptosternum* exist in India, but not in Afghanistan, Turkestan, or Yarkand.

Callichrous and *Amblyceps*, which are found in India, appear to be present in Afghanistan, and the former also in Cashmere.

Exostoma is found along the Himalayas; *Silurus* in Turkestan and India.

CYPRINODONTIDÆ. *Cyprinodon* and *Haplochilus* are found in India.

CYPRINIDÆ. Genera *Psilorhynchus*, *Cirrhina*, *Amblypharyngodon*, *Nuria*, *Rasbora*, *Aspidoparia*, *Rohtee*, *Perilampus*, *Chela*, *Homaloptera*, and various genera of Cobitidinæ exist in India.

Discognathus, *Labeo*, and *Barilius* are common to India and Afghanistan, but are evidently Indian forms.

Oreinus, *Schizothorax*, and *Barbus* are found in India, also in Afghanistan, and the two last in Turkestan, whilst *Schizothorax* is common in Yarkand. *Cobitis* or *Nemacheilus* seem to extend everywhere.

CLUPEIDÆ and NOTOPTERIDÆ. Of the genera belonging to these families, and which exist in the fresh waters of India, none go beyond the base of the Himalayas.

The *fishes of Yarkand** consist of species of the following genera:—*Schizothorax*, found also in Afghanistan and Turkestan; one species on the slopes of the Himalayas, and sometimes even descending to the plains. *Diptychus*, Tibet, Yarkand, and Turkestan. *Schizopygopsis*, Tibet and Yarkand. *Ptychobarbus*, Tibet and Yarkand. The remainder are Loaches.

Diptychus dybowskii, Kess., would almost seem to be a *Schizopygopsis* with an articulated dorsal ray and a pair of maxillary barbels. Perhaps several of these hill-genera will, at some future date, be properly amalgamated, as has been done with the low-country Barbels (*Barbus*).

An examination of the genera of spiny-rayed or Acanthopterygian fishes clearly shows that, as we proceed inland in India they diminish, at the Himalayas they cease. Two Indian species † only have been observed to exist in Afghanistan; and they are amongst the most widely distributed of their respective genera. Neither of these extends in the N.E. either to Turkestan or Yarkand. In Turkestan, it is true, three genera of this order are represented; but they have evidently extended southwards. Yarkand and Tibet appear to be unsuited for this Order of fishes; and thence none have been brought.

The Physostomi include all the Yarkand and Tibet fishes.

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* I here omit the genera *Exostoma* from the Himalayas and *Oreinus* from the Himalayas and Afghanistan.

† *Ophiocephalus gachua* and *Mastacembelus armatus*.

Among Siluroids the Indian genera *Callichrous* and ? *Amblyceps* have been doubtfully recorded from Afghanistan; but neither have spread to Turkestan, where, however, the *Silurus glanis* is found, evidently a wanderer from its more northern home.

It is clear that in India there is a gradual diminution of Siluroids as we proceed inland until we arrive at the Himalayas. On the slopes of these mountains we at first obtain a few peculiar genera and species organized for a mountain-torrent life; but as we rise, eventually (as was the case in this Mission) an elevation is attained which, taken in connexion with the latitude and paucity of food, seems to be beyond the limit of the Indian Siluroids.

The Siluroids along the slopes of the Himalayas appear to be mostly confined to the following:—A few, as *Macrones* and *Callichrous*, ascend a short distance; but this may be considered accidental. *Pseudecheneis* is a more distinct hill-form, possessing a sucker formed of transverse folds between its pectorals on the chest, and by the aid of which it prevents itself being carried away by the torrents. *Glyptosternum* has also an adhesive sucker, but of longitudinal folds, and likewise placed on the chest. These fishes, however, appear to be more intended for rapid rivers in the plains; but some ascend the slopes of the Himalayas. I have taken *large specimens* from the rivers at the base of the hills in which the suckers were scarcely visible: whether they had outgrown them, or, owing to the suckers not having been primarily well developed, they had been unable to maintain their footing in the hill-streams, of course, one cannot decide. *Amblyceps* is a Loach-like form found in the waters of the plains and also of the hills; it is abundant near Kangra. *Exostoma*, an example of which exists in the Yarkand-Mission collection, is also a remarkable form. It has a broad and depressed head and chest, the latter forming a species of sucker to enable it to sustain a mountain-torrent life.

This fish (*Exostoma stoliczkæ*) belongs to a genus which has only been recorded from hilly regions, neither extending to the waters of the comparatively levels of the high lands, nor descending any distance towards the plains. The following six species are known:—1. *E. stoliczkæ*, from the head-waters of the Indus; 2. *E. blythii*, from near Darjeeling, where the waters descend to the Ganges; 3. *E. labiatum*, from the Mishmi Mountains and Eastern Assam. 4. *E. andersonii*, from near Bhamo on the confines of China; 5. *E. davidi*, from the most easterly portion of Tibet near the head-waters of the Yang-se-kiang; 6. *E. berdmorei*, from Tenasserim.

The distribution of the foregoing six species of this genus is interesting, because it is suggestive of whether at some remote period the Himalayan range, the mountains between Tibet and China, and the spur or continuation southwards through Burma and Siam, may not have been connected one with another.

Whilst adverting to this point, I would mention another circumstance: the only Siluroid stated to be found in Turkestan is the *Silurus glanis*, Linn. Three other species of the same genus have been captured on the hill-ranges of India; and their distribution somewhat accords with that of *Exostoma*.

1. *Silurus cochinchinensis*, Cuv. & Val. = *Silurichthys berdmorei*, Blyth, and (2) *Silurus wynaadensis*, Day. These fishes, found in hills up to about 2500 feet, have been obtained in the western ghauts, Akyab hills, Tenasserim, and Cochin China. They would appear to be restricted to those mountains which are not far removed from the sea-coast. How it is that several species of fishes are common to Malabar and Siam, or the countries contiguous to it, whilst they are entirely absent from the intermediate districts of India, is a question which I do not propose entering upon.

3. *S. dukai*, Day, is from Darjeeling.

Cyprinidæ form the entire collection of the Yarkand Mission, after its arrival beyond the head-waters of the Indus. If we examine the members of this family found on the Himalayas in the same manner as we have the Siluroids, we find as follows:—*Discognathus*, so recognizable by the sucker on the lower lip, is found some distance up the mountains, but is rare above 5000 feet. *Oreinus* *, with its small scales, broad mouth, and likewise a sucker behind the lower jaw, becomes more and more common the higher we ascend. The expedition obtained one species at Leh or Ladak, the head-waters of the Indus; and it has been found as a genus extending from Afghanistan along the Himalayan range, and near Bhamo by the last Yunnan Mission, or the same district as the Siluroid genera *Exostoma* and *Silurus*. It appears to essentially prefer the sides of hills and impetuous torrents.

Some of the stronger Labeos, Barbels (*Barbus*), and a *Barilius* are found here and there on the slopes and in the side streams of the Himalayas up to very considerable heights. They, however, are of Indian forms which, if able to do so, appear to migrate during the breeding-season to the mountains to deposit their ova in the side streams which are unreplenished by snow-water. Here the fry are often compelled to remain until the succeeding year's rains swell the waters, washing food into their retreats to enable them to grow, or else to permit them to descend to the plains.

Once near the summit of these mountains, and beyond districts where adhesive suckers are a necessity for moderate-sized fishes to possess to prevent their being washed away, we come upon genera as rare in the plains of India as are the Indian forms at the summit of the Himalayas.

Cashmere is a locality traversed by this Mission, a hilly Himalayan district, and one which it is necessary to refer to. In Hügel and Heckel's 'Fische aus Kaschmir" we find the following species recorded:—

Oreinus plagiostomus, Heckel; *O. sinuatus*, Heck.; *Schizothorax curvifrons*, Heck.; *S. longipinnis*, Heck.; *S. niger*, Heck.; *S. nasus*, Heck.; *S. huegelii*, Heck.; *S. micropogon*, Heck.; *S. planifrons*, Heck.; *S. esocinus*, Heck.; *Cirrhina gohama*, Ham. Buch.; *Barbus*

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* This belongs to a group characterized, amongst other things, by a row of tiled scales along the base of the anal fin, and enclosing the excretory outlets.

tor, H. Buch.; *Labeo varicorhinus*, Heck.; *Nemacheilus marmoratus*, Heck.; *Callichrous lamghur*, Heck.

These fishes demonstrate relationship with three districts:—*Schizothorax* with Afghanistan and East and West Turkestan; *Oreinus* with the slopes of the Himalayas in their whole extent; *Cirrhina*, *Barbus*, and *Callichrous* with the neighbouring fauna of Hindustan.

Having examined what are the ingredient parts of the fish-fauna of Western Turkestan, Afghanistan, Hindustan, Yarkand, Tibet, and Cashmere, it will be interesting to endeavour to discover if these localities are possessed of any indigenous forms, and, if so, how far they extend into contiguous countries.

I do not propose inquiring into whether the great desert region of Central Asia can or cannot be included in one Tartarian subregion; but, as the zoology of this portion of the globe is at present rather obscure, I think it will be more useful to limit one's self strictly to ascertained facts.

Dr. Sclater observes (Address, Biological Section, British Association, 1875) that Mr. Forsyth's embassy "to Yarkand has led naturalists into the fringe of the Tartar subregion." I would, however, suggest, in an ichthyological point of view, whether the Russian investigators have not been more on the outskirts of a peculiar region of which Yarkand may be the centre; for certainly it is richer in forms of *Schizothoracinæ* than Western Turkestan appears to be.

In the cold and hilly districts of Tibet and Yarkand we observe an absence of spiny-rayed and Siluroid fishes; whilst amongst Carps we see the genera *Schizothorax*, *Ptychobarbus*, *Schizopygopsis*, and *Diptychus*—fishes belonging to a peculiar division of Carps (*Schizothoracinæ*, or Hill-Barbels), which may be thus defined:—

Carps *more or less covered with minute scales, or destitute of any. A membranous sac or slit anterior to the anal fin, which is laterally bounded by a row of vertically placed scales, like eave-tiles, and which are continued along the base of the anal fin.*

The fishes composing this are mostly of an elongated form, and are divisible into:—

a. Those with transverse mouths, as *Oreinus*, *Ptychobarbus*, *Schizopygopsis*, *Diptychus*.

β. Those with compressed mouths, as *Schizothorax*.

The genus *Oreinus* is spread from the Helmund river and Jellalabad in Afghanistan, along the whole Himalayan and contiguous ranges of hills to at least the confines of China. So far as I know, these fishes appear to be strictly residents of rivers in hilly regions, neither descending far into those of the plains nor found on the level plateaux on the summits of the mountains. This accounts for their absence from the Yarkand collection; and from the foregoing extracts it appears probable that they are not found to the north of the Oxus. This genus appears to be on the outskirts of the rest of its group; and its mouth armed with a sucker, to resist its being washed away, makes it well able to sustain a mountain-torrent life.

The other genera are more or less spread in the following districts. From the Helmund river and the eastern portion of Afghanistan, the upper parts of the Oxus, and the eastern portion of Western Turkestan, the Tian Shan or Celestial mountains, and also the Alatau mountains more to the south, they extend along the Himalayan region, certainly as far as the most easterly part of Assam.

These fishes (*Schizothoracinæ*) are confined to cold regions, as a rule, or at least to localities possessing snow-fed rivers, many of which rivers end in lakes and do not go to the sea. They extend from Eastern Afghanistan and Western Turkestan through Tibet, and the most westerly portion of China, along the Himalayas to the hills in the Yunnan direction.

Loaches (*Nemacheilus*) are likewise generally distributed; and it is remarkable, as I have already observed, that all are scaleless. The same appears the rule in Western Turkestan.

The conclusion, I think, we may fairly arrive at, after examining the fishes of Yarkand and the adjoining countries is, that we find a peculiar group of Carps (*Schizothoracinæ*) which has spread almost due east and west from the cold and elevated regions of Eastern Turkestan, but of which the southern progress has been barred by the Himalayas.

If we look to the south we see, as it were, that a wave of tropical forms of fishes has, at a prehistoric period, expanded over that portion of the globe where the Nicobars, Andamans, and the most southern portions of the continent of Asia now are, that this fish-fauna has its northward progress arrested by some cause at or near where the Himalayas now exist and mark the division between the fish-fauna of India and that of Turkestan.

3. Description of new Genera and Species of Phytophagous Coleoptera. By MARTIN JACOBY.

[Received November 20, 1876.]

Family CRIOCERIDÆ.

Genus CRIOCERIS, Geoffroy.

1. CRIOCERIS AUSTRALIS, sp. nov.

Oblong, fulvous, fuscous below; head a little darker-coloured than the elytra, finely golden pubescent at its lower half, impunctate at the remainder, convex between the eyes, the frontal oblique grooves feebly impressed and a distinct transverse depression above them; antennæ scarcely half the length of the body, entirely black, with rather short cylindrical joints, the second of which is the shortest, the fifth the longest; thorax coloured as the head, subquadrate, with its anterior half greatly widened, deeply but not largely constricted behind its middle and transversely grooved near the base, smooth and shining; elytra much wider than the thorax, a little constricted before the middle, of a light fulvous colour, scarcely impressed below the base, with only four or five partly interrupted punctured striæ, of which the first, in shape of an impressed groove, runs parallel with the suture, while the last is only distinctly visible till about the middle of the elytra, the rest of the surface entirely impunctate, and the lateral margin strongly sulcate through its entire length; body beneath dark fuscous, the abdominal segments margined with lighter brown, legs black, the whole covered with golden pubescence.

Length 4 lines.

Hab. Australia.

Although this species seems closely allied to *C. obliterata*, Baly, by the obliterated striæ on the elytra, it differs in other particulars sufficiently to justify its classification as another species.

C. obliterata is excavated between the eyes, while in this species this space is *convex*, and the antennæ *entirely* black and *shorter* than half the body; the deep impressions near the lateral border in *C. obliterata* are here also entirely wanting.

Two specimens are contained in my collection.

Genus LEMA.

2. LEMA PURPURASCENS, sp. nov.

Elongate, subparallel, subdepressed, shining fulvous, with a purplish hue; head with the front obliquely grooved on each side, covered on the face with yellowish pubescence; labrum, apex of jaws, and eyes black; antennæ half the length of the body, with the second joint half the length of the third, the fourth scarcely longer than the preceding one, the rest elongate, cylindrical, black, with the exception of the first four joints, which are fulvous; thorax with the sides deeply constricted in the middle, and a strongly marked transverse depression near the base, two shallow foveæ are also visible on the disk near the lateral depression, surface shining, smooth, with a few punctures near the anterior margin and two longitudinal lines of punctured striæ in the middle; elytra much wider than the thorax, transversely depressed below the shoulder, and constricted longitudinally from the shoulder at the lateral margin towards the middle, each elytron with 10 rows of strong punctures, the first very short; near the apex the punctuation is much deeper, and the intervals assume the form of raised costæ; underside and legs slightly lighter than the upperside, tarsi fuscous.

Length $4\frac{1}{2}$ lines.

Hab. Madagascar.

Family MEGALOPODINÆ, Lac.

Genus AGATHOMERUS, Lac.

3. AGATHOMERUS DUBIOSUS, sp. nov.

Oblong, fulvous ferruginous above, black beneath. This species agrees in size, shape, and coloration above entirely with *A. rufus*, Lac., but differs in the following particulars: in *rufus* the entire underside and legs are testaceous, with the exception of a few black spots on the abdomen, while in *dubiosus* these parts are shining black, with the exception of the tibiæ and tarsi, which are ferruginous; in *rufus* the scutellum is of the same colour as the body, while in *dubiosus* it is entirely black; and although this species may only be a variety of *rufus*, I find no mention made of it in Lacordaire's description.

Two specimens from Mexico in my collection.

Family CLYTHRINÆ, Lac.

Genus MEGALOSTOMIS, Lac.

4. MEGALOSTOMIS BASILARIS, sp. nov.

Short, ovate, subdepressed, flavous, sparingly pubescent above, strongly beneath. Head black, pubescent, shining, closely punctate, striated near the eyes, leaving only a narrow space in the middle of the vertex smooth, two large depressions divided by a raised middle line in front of the eyes, the latter light-coloured. Antennæ dentate from the fifth joint, reaching to the base of the thorax. Posterior angles of thorax indistinct, anterior ones produced, the sides widened from before the middle towards the base, rounded, the median lobe at the base largely rounded; the entire surface closely punctured and covered with whitish pubescence, sparingly on the disk, closely near the sides; two large red spots occupy almost the entire sides, but are partially covered with hairs, and therefore only plainly visible near the base, where the pubescence is less dense. Elytra a little wider at the base than the thorax, closely and confusedly punctate, a little finer near the apex, the punctures showing a tendency to arrange themselves in striæ near the suture; the whole surface sparingly covered with stiff whitish hair; exactly on the shoulder of each elytron is a round black spot, the extreme base of the elytra, as well as the sutural line, is also narrowly edged with black. Entire underside reddish, densely covered with white pubescence; femora and tarsi black; tibiæ testaceous.

Length 4 lines.

Hab. Peru.

A single specimen in my collection.

5. MEGALOSTOMIS AMAZONA, sp. nov.

Ovate, of same shape as *basilaris*, light brownish above, finely pubescent, beneath thickly clothed with yellowish hair; head divided in the middle by a longitudinal raised line, closely punctured and pubescent, posterior margin of epistome dentate, anterior emarginate in middle; jaws and antennæ black, eyes brown; thorax shaped exactly as in the preceding species, densely covered with golden yellow hair, which also extends to the scutellum; elytra about two and a half times the length of the thorax, reddish brown, finely but closely pubescent, the base, a narrow transverse band in the middle, and a round spot near the apex black.

Length 4 lines.

Hab. Amazons.

Two specimens in my collection.

Genus SAXINIS, Lac.

6. SAXINIS PROPINQUA, n. sp.

Oblong, parallel, shining violet-blue, beneath moderately covered with short whitish pubescence. Head finely and sparingly punctured near the vertex, finely striated round the eyes. Antennæ with the second and third joint fulvous. Thorax broader than long, minutely punctured on the disk, stronger at the sides and base. Scutellum broad, triangular, strongly punctured. Elytra rather deeply punctate-striate, the punctures more crowded near the scutellum, the interstices raised a little and smooth. A bright red spot on each shoulder of a rounded, triangular shape, which does not extend to the lateral margin except at the base, which at that place is perfectly smooth. Legs violet-blue.

Length 2 lines.

Hab. California.

This species is closely allied to *S. omogera*, Lacord., and also to *S. quadrina*, Lac., but is distinguished from the first by its much finer punctuation of the elytra, and especially of the thorax, by the antennæ having the 2nd and 3rd joints fulvous, and from *S. quadrina* by the different shape of the red shoulder-spot, which is in this species quadrate, while in the species before us, it is smaller and triangular.

7. SAXINIS GUATEMALENSIS, n. sp.

Oblong, parallel, above dark greenish black, shining, beneath closely covered with white pubescence. Head closely covered with longitudinal striæ, which, towards the mouth only, assume the form of punctures. Thorax much widened in the middle, very convex and everywhere closely covered with distinct punctures, which towards the sides are a little more strongly impressed. Scutellum with a raised middle line also strongly punctured. Elytra very strongly punctate-striate, the intervals between the striæ also distinctly punctured. A large nearly square brick-red spot occupies the shoulders, reaching downwards to about one third of the length of the elytra and transversely to only a short distance from the scutellum. Legs densely covered with white pubescence, through which a coppery reflection is distinctly visible.

Length 3 lines. Collected by Mr. Salvin in Guatemala, at an elevation of 5000 feet. In my collection.

Family CHLAMYDIDÆ.

Genus CHLAMYS, Knoch.

8. CHLAMYS BARTLETTI, sp. nov.

Ovate, metallic violet-blue; head deeply excavated, strongly but not closely punctured; labrum, palpi, underside of first joint, as well as the second and third entire joints, of antennæ ferruginous. Thorax with the lateral margin rounded, the posterior deeply sinuate, rugose-punctate, with a high triangular elevation on the middle of its disk, the top of which is divided by a shallow longitudinal channel, the posterior sides at the same time falling off suddenly towards the base of the thorax, and occupied by another small rounded elevation not reaching the lateral margin. Scutellum acute triangular, impunctate. Elytra with the sutural margin dentate almost through its entire length, the surface of each elytron containing three strongly raised curved ridges running nearly in a line with each other, and connected together by short transverse branches and here and there by a network of elevated striae; besides these three large ridges another short one of an S-shape is situated near the suture at the base, and joined to the first ridge in its middle. Body beneath, together with the legs, greenish blue, closely rugose-punctate; last joint of the tarsi ferruginous.

Length 3 lines.

Hab. Peru.

This beautiful species, which was discovered by Mr. E. Bartlett during his travels in Peru, is easily separated from others by its brilliant metallic blue, its size, and the markings of its elytra (which approach to a certain extent those of *C. episcopalis*, Lac.), but yet is very different in its general character. The species is in my collection.

9. CHLAMYS UNICOLOR, sp. nov.

Ovate-oblong, convex, subcylindrical, narrowed behind, upper and underside unicolorous bluish olive-green, not shining. Head with a longitudinal impression; anterior margin of epistome rounded, the entire face strongly punctate; labrum shining fulvous; antennæ either entirely or only the basal joints light brown. Sides of thorax almost straight, converging from base to apex, angles moderately acute; posterior margin not bisinuate but largely waved, median lobe moderately produced, its apex bidentate, as usually in this genus; upper surface closely punctate; a humplike elevation of moderate size is situated on the disk, divided by a shallow channel and surrounded on all sides by another narrow depression; each side of the hump is furnished with 6 tubercles, of which 5 are situated in a semicircle, while the sixth is contained in its middle; scutellum transversely subquadrate, its sides sinuate, narrower at the base than at the apex, hollowed out in its middle, impunctate. Elytra distinctly narrowed from their base towards the apex, sides almost as far lobed as their middle; upper surface coarsely but widely punctate, forming only one regular stria at the sutural margin, which latter is finely dentate from the middle to the apex; transverse irregular costæ and a few tubercles are placed without order on the disk of each elytron. Underside deeply impressed with numerous round large punctures, which, however, extend to the legs only sparingly.

Length 2 lines.

Hab. Amazons.

The peculiar olive-green colour, as well as the small size and the position of the tubercles on the thorax, will distinguish this species at first sight from others.

10. CHLAMYS PALLIDA, sp. nov.

Ovate, narrowed in the middle, above pale testaceous mixed with brown. Head testaceous, with the upper portion of a darker brown closely and rather deeply punctate; flat, without any depressions; apex of jaws black, labrum brown shining; antennæ entirely ferruginous brown. Thorax mounted at its posterior half by a rather high elevation of a triangular shape very nearly of the same form as in *C. bartletti*, but divided by a wider channel, the edges of which are strongly sinuate-rugose; a patch on each side below the elevation, as well as seven small spots arranged in a half-circle in the middle of the thorax, dark brown; the whole surface deeply pitted with brownish punctures, nearly the entire posterior margin dentate, of a black colour; scutellum pale testaceous, with acute posterior angles, impunctate. Elytra deeply punctate, confused-reticulate at their posterior half, the punctures from the base to the middle of a deep brown, from there of a lighter colour; a distinct costa or ridge runs from the base in a curved line towards the apex, not quite reaching the latter, sending off a short branch from the third part of its length towards the base between the shoulder and the first ridge; another short elevation exists close to and a little beneath the scutellum; the entire apical region punctate-reticulate, and the sutural margin dentate nearly through its entire length. Body beneath of the same colour as the elytra; a rounded spot of a ferruginous colour is situated on the abdomen close to the margin of the elytra, while the legs in their middle also bear a patch of the same colour, which occupies the tarsi and claws entirely; the whole undersurface deeply punctured.

Length 3 lines.

Hab. Amazons.

In my collection.

11. CHLAMYS EXCAVATA, sp. nov.

Oblong, subcylindrical, narrowed behind, above entirely ferruginous, below testaceous; head deeply punctate, the punctures of a more or less dark brown colour, labrum fulvous shining, jaws black; basal joints of the antennæ ferruginous, the rest fuscous; thorax raised gradually to a hump-like elevation of a rounded shape, the top of which is divided by a shallow depression, the entire surface closely rugose-punctate, the punctures a little less crowded near the sides; scutellum bisinuate, smooth. Elytra with an excavated space of a dark fuscous colour reaching from the base near the scutellum to nearly the middle of their disk, the commencement and the end of which is marked by a short pointed tubercle; exactly in the middle of each elytron is another fovea of an oblique direction towards the shoulders; the entire surface confusely punctate-rugose, the sutural margin dentate in the same way as the preceding species; pygidium much more widely punctured, the interstices plane, and a little shining. Legs and tarsi of the same colour as the underside; claws fuscous.

Length 2½ lines.

Hab. Amazons.

In my collection.

Family EULMOLPINÆ.

Genus CHALCOPHYMA, Baly.

12. CHALCOPHYMA STRIATUM, sp. nov.

Subquadrangular, rounded behind, cupreous or dark greenish; antennæ, labrum, and tarsi light testaceous. Head very finely striate, the striæ all running towards a depression in the middle of the head; forehead rather widely punctate, closer towards the lower portion of the face. Thorax widened in the middle, the lateral margin bidentate, impressed with very deep punctures, which are more crowded along the anterior margin, leaving an elevated space exactly in the middle of the base either perfectly smooth or with one or two impressions. Scutellum semiovate, impunctate and shining. Elytra either dark cupreous or greenish with a purple reflection round their edges each elytron with five or six elevated and interrupted ridges on its surface, the space between which is deeply punctured, the punctuation terminating in regular striæ towards the apex. Body beneath black; the legs sometimes dark bluish, or copper-coloured; posterior femora near their apex with a distinct triangular tooth.

Length 2–2½ lines.

Hab. Amazons.

In my collection.

13. CHALCOPHYMA TUBERCULATUM, sp. nov.

Subquadrate, bronze-coloured. Head closely punctured, finely striate; antennæ very slender, with the first six joints flavous, the rest fuscous. Thorax deeply rugose-punctate, as well as two large elevations on the middle of its disk; several smaller rugosities are situated near the sides, but are impunctate. Scutellum closely punctured. Elytra deeply rugose and impressed with large punctures and transverse raised striae, besides which each elytron is also furnished with a number of longitudinal short tubercules, which are situated as follows, viz. one on the shoulder, and a second below it in an oblique direction, four at a little distance from the shoulder running down towards the apex, and two other rows closer towards the suture, running parallel with the last one. Legs rather long for this genus, ferruginous, as well as the last abdominal segments.

Length 2¼ lines.

Hab. Cayenne.

In my collection.

14. CHALCOPHYMA RETICULATUM, sp. nov.

Subquadrate, rounded behind, dark purplish or violet; head marked exactly in the same way as in *C. striata*; antennæ flavous; thorax of the same shape as in the preceding species, deeply and closely punctate, the intervals between the punctures raised and forming a network in a longitudinal direction; towards the sides are some deeper and larger impressions; scutellum smooth, shining; elytra with a number of indistinct elevated costae, between which the space is deeply punctate and rugose. Legs red brown.

Length $2\frac{1}{4}$ lines.

Hab. Amazons.

This species is sufficiently distinguished from *C. striata* by the reticulate sculpture of the thorax, and the much more numerous costæ on the elytra, which are only now and then interrupted, but extend in two or three instances through the entire length of the elytra.

Genus TYPOPHORUS, Erichson.

15. TYPOPHORUS MEXICANUS, sp. nov.

Ovate, convex, above violet-blue, beneath black with a green tinge. Head reddish brown, finely and sparingly punctured, with a distinct triangular groove at its lower half, and a deep curved depression above each eye; jaws dark brown; antennæ more than half the length of the body, with the first three or four joints reddish, the rest black, covered with whitish pubescence. Thorax of the same colour as the head, with the posterior and lateral margin evenly rounded, the anterior widened in the middle, impressed in the same way as the head, with minute punctures only visible under a strong lens; scutellum broader than long, impunctate. Elytra of about double the length of the thorax, with their sides nearly parallel, violet-blue, impressed with ten rows of punctures, which diminish a little in size towards the apex; below the shoulder is a short transverse depression, usually to be found amongst this genus. Legs and tarsi coloured as the underside.

Length $2\frac{1}{2}$ lines.

Collected by Mr. O. Salvin at Guatemala. In my collection.

16. TYPOPHORUS MELANOCEPHALUS, sp. nov.

Ovate, moderately convex, metallic green or blue. Head greenish black, strongly and closely punctured; antennæ long and slender, with the first five or six joints fulvous, the rest dark brown. Thorax red, a little more strongly punctured than in *T. mexicanus*; otherwise of same shape; the middle of the anterior margin is marked with a short greenish patch which seems to be a continuation of the coloration of the head. Elytra very strongly punctate-striate, with the usual transverse depression below the shoulder. Underside and legs black.

Length 3 lines.

Hab. Mexico.

Although this insect is at the first view only distinguished from the preceding species by its larger size, the above details, especially the strong punctuation and dark colour of the head, I think, justifies the making it a distinct species, moreover as all the specimens in my collection agree exactly in every particular.

17. TYPOPHORUS HUMERALIS, Baly, var. *rufa*.

Ovate, convex, base of the antennæ fulvous. Head, very convex and shining, finely punctured, together with the thorax black. Elytra unicolorous, rufous, which colour extends sometimes over the entire thorax.

Length 2½ lines.

Hab. Guatemala.

Collected by Mr. Salvin.

As this species agrees in every thing with *T. humeralis* of Dr. Baly (described in the Annals of Natural History, 1859), except the coloration, I consider it a mere variety of this species, which, to my knowledge, has not yet been described.

18. TYPOPHORUS QUADRIPLAGATUS, sp. nov.

Ovate, moderately convex, light flavous. Head without a groove near the eyes, which are rather closely approximated, strongly punctate on the vertex, flavous; antennæ of the same colour, with the exception of two or three middle joints, which are a little darker. Thorax of the usual shape, strongly but not closely punctured. Elytra a little narrower at the base than behind the middle, with ten rows of strongly punctured striæ; the intervals slightly raised, of a light flavous colour; each elytron ornamented with two black spots, viz. one on the extreme margin a little before the middle, and a second larger one in the middle, exactly between the margin and the suture. Underside dark brown, as well as the last third of the femora; the rest, with the legs and tarsi, testaceous.

Length 2 lines.

Hab. Amazons.

In my collection.

19. TYPOPHORUS MINUTUS, sp. nov.

Ovate, convex, black-brown, shining. Head very convex, without any trace of a transverse groove, but with a slight depression in the middle, upper part distinctly and closely punctured; first five joints of antennæ flavous, the rest black. Thorax nearly as long as broad, with the sides much contracted towards the anterior margin, and the posterior one a little sinuate, more or less distinctly punctured, scutellum oblong, smooth. Elytra strongly punctate-striate; the first striæ assuming the form of a continuous line towards the apex and parallel with the suture. Underside and legs black.

Length 2 lines.

Hab. Rio Janeiro.

In my collection.

By its minute size and the uniform coloration of all the parts, which now and then and in certain lights assumes on the head and thorax a lighter brown, this species is sufficiently distinguished from others.

Family CHRYSOMELIDÆ.

Genus DORYPHORA, Illig.

20. **DORYPHORA RUGOSA**, sp. nov.

Oblong-ovate, rounded and widened in the middle, very convex towards the first third of the elytra, then falling off abruptly towards the apex. Above blackish blue, variegated with testaceous, below black, shining. Head deeply and closely covered with punctures which run together towards the epistome, with a longitudinal middle groove through its entire length. Antennæ rather longer than the thorax, robust, black, shining, with the third joint the longest and thinnest. Thorax with the lateral margin slightly rounded and the posterior one sinuate, punctured in the same way as the head, on its surface more strongly towards the sides, these latter excavated and flattened and accompanied by a fulvous narrow band, which is much hollowed out at its inner margin. Scutellum impunctate. Elytra broader than the thorax, everywhere covered with rugosities and deep impressions distinctly visible to the naked eye; a narrow dentated band of testaceous colour extends across the middle from one side to the other, sending upwards three or four branches of the same colour towards the base; while the posterior half of the elytra is variegated in the same way, more strongly visible near the suture. The mesosternal process comparatively short and straight.

Length 8 lines.

Hab. Columbia.

In the collection of Dr. Baden, in Altona, and my own.

21. **DORYPHORA COSTATA**, sp. nov.

Ovate, very slightly widened behind, very convex towards the first half, then suddenly falling off towards the apex, above dark brown, a little shining, beneath black. Head and thorax without gloss; the first with a rather deep longitudinal impression before the anterior margin of the eyes, a transverse groove between the antennæ, and a few scattered punctures here and there; labrum brown, shining; antennæ not reaching quite to the base of the thorax, light flavous, the first joint much thickened, almost cylindrical, the second very short, the third the longest, double the length of the fourth, the rest thickened, cylindrical. Thorax with the sides straight and parallel, the anterior corners rounded and produced into a point reaching slightly above the eyes; posterior margin slightly sinuate, anterior straight in middle, with a distinct margin which extends also to the sides, where it is, however, very narrow. The surface impressed with a few strong punctures, which are a little more numerous towards the sides. Elytra wider at the base than the thorax, assuming their greatest convexity exactly at the middle, from there suddenly declining to the apex; each elytron with ten rows of elevated ridges, of which the first and second are united at a little distance from the base, and the sixth and seventh at a short distance from the apex; all the interstices between the ridges deeply impressed with shining green punctures. Legs and tarsi brown. The mesosternal process is much developed, slightly curved and pointed.

Length 7 lines; width 5 lines.

Hab. Columbia.

This beautiful insect was collected by Mr. Wallis, and is in the collection of Dr. Baden, in Altona, and my own.

ENSIFORMA, nov. gen.

Elongate, parallel; head small, perpendicular; eyes convex, small; palpi clavate, with a short acute terminal joint; antennæ as long as the body, with the first seven joints (the second excepted) slender, elongate-triangular, the next three greatly widened at their apex and broadly flattened, the terminal joint long, and pointed at the apex. Thorax subquadrangular, narrowed towards the base, the angles obtuse; scutellum broad triangular. Elytra wider at the base than the thorax, the sides parallel, punctate-rugose at the surface. Femora and tibiæ of equal length and size, the first but little widened in the middle; tarsi with the first joint as long as the two following joints together; claws bifid.

Type *Ensiforma cærulea*, sp. nov.

This genus, which bears a close affinity to the genus *Diabrotica*, will be easily distinguished from that and other genera by the extreme length of the antennæ and their flattened terminal joints.

22. ENSIFORMA CÆRULEA, n. sp.

Elongate, parallel, dark blue above, fuscous below; the head, thorax, the scutellum, and legs flavous. Head transversely grooved, between the eyes joined by a short longitudinal groove in the middle of the face; first four joints of antennæ fuscous above, flavous beneath, the other joints entirely dark brown; eyes black. Thorax with the anterior and posterior margins nearly straight, slightly narrowed from behind the middle to the base, the angles obtuse; above but little convex, with two shallow depressions on the disk near the sides, shining, together with the scutellum impunctate. Elytra a little broader at the base than the thorax, distinctly margined from the shoulder towards the apex; closely punctate and partially transversely rugose, of a dark bluish green colour surrounded at the sides by a narrow light flavous margin, which widens a little at the extreme apex; another short streak of the same colour is situated on each elytron between the shoulder and the scutellum. Underside, the breast excepted, fuscous, as are also the fore legs and posterior femora; tibiæ and tarsi of the last two pair of legs dark brown, covered, as well as the whole underside, with yellowish and rather long hair.

Length 4 lines.

Hab. Brazil.

One specimen in my collection.

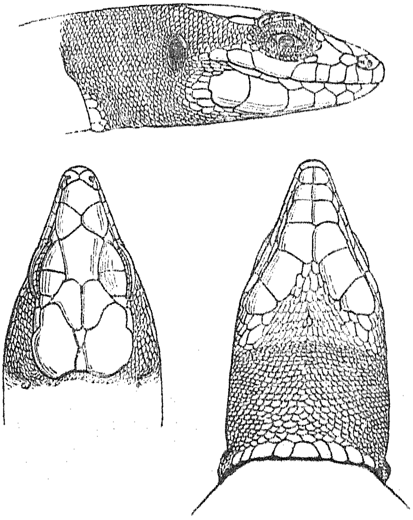
4. Description of a new Species of Lizard from Asia Minor.

By Dr. A. Günther.

[Received November 27, 1876.]

ZOOTOCA DANFORDI.

Similar in habit to *Z. muralis*. Nasal shields in contact with each other on the upper surface of the snout; two small postnasals, one above the other, followed by two loreal shields. Infraocular shield forming the margin of the upper lip between the fifth and seventh supralabials, five supralabial plates being before the infraocular. Temples covered by very small scales subequal in size, without larger central plate. Posterior frontals in contact with each other. Supraorbitals large, bordered externally by a supraciliary line of granules.



Zootoca danfordi. Not quite twice natural size.

Back covered with smooth roundish granules. Ventral shields broad, in six longitudinal and twenty-eight transverse series. One broad preanal, sometimes divided into two, surrounded anteriorly by six small scutes.

Greenish olive, with black dots, the dots being numerous on the sides of the body and head, and throat, but isolated and sparse on the back and abdomen.

Young specimens reticulated with black. The largest example is 3 inches long, without the tail.

Several specimens of this species were collected by C. G. Danford, Esq., on the Zebil Bulgar Dagh (Cilician Taurus), at an altitude of 4000 feet.

5. Description of a New Snake of the Genus *Aspidura* from Ceylon. By WILLIAM FERGUSON, F.L.S.

[Received November 28, 1876.]

ASPIDURA GUENTHERI, sp. nov.

The postfrontal enters the orbit, and is in contact with the second and third labials, preorbital well developed and elongate, the postfrontal separating it considerably from the superciliary; the upper postorbital is much larger than the lower one, and is in contact with the superciliary, occipital, and first temporal; six upper labials. Two pairs of chin-shields, the anterior large, about thrice as long as broad; the posterior small, scale-like; six (seven) lower labials, the four anterior of which are in contact with the anterior chin-shields. Scales in 17 rows, smooth, hexagonal, not elongate, and but very slightly imbricate; the first row next ventrals broadest, and the next two rows broader than the others, the length not much greater than the breadth. Ventral shields 104–118, subcaudal 18–26. The circumference of the body is about one tenth of the total length, the length of the tail one eighth. Snout in front of eyes sharply pointed compared with *A. brachyorrhos*. The anterior frontal extends back between the postfrontals further than the anterior ends of the third labials, whilst in *A. brachyorrhos* it is obtuse, and does not extend beyond the second labials. Colour, a glossy shining metallic dark olive-brown above, the belly slate-coloured. Three rows of small indistinct darker spots along the back—one row dorsal, and the others on the fourth or fifth row of scales from the ventrals, each darker spot occupying about one scale, and generally whitish spots on some of the other scales near them. Generally a white collar immediately behind the head, often broader below, and sometimes extending in a Λ from the neck along the upper part of the head, covering portions of the occipitals, and separated by a narrow dark line; often a white spot from upper labials below and behind the eye. These white markings on neck and head are more or less present on all my specimens; but occasionally they are indistinct above, and absent on the lower part of the head. Total length of the longest specimen seen 6·2 inches, the length of tail about 0·7 inch.

Hab. Ceylon.

Dr. Günther having expressed his doubts as to whether two specimens of this species sent to him by me in March 1872 were not the young of *A. brachyorrhos*, and having asked me to reexamine my specimens, I am now in a position to say that *A. guentheri* cannot possibly be confounded with any of the other three species known. *A. copii* is a large stout snake, and found hitherto only in the district of Dickoga, at an elevation of about 4000–5000 feet. *A. trachyprocta* is also an alpine snake, and never found, that I am aware of, except in the mountains of Ceylon. *A. guentheri* cannot be confounded with either of these; and it has scarcely any specific character in common with *A. brachyorrhos*, excepting that both have seventeen rows of scales round the body. *A. brachyorrhos* has never, as far as I know, been found near the coast of Ceylon, whilst *A. guentheri* occurs close to the coast, and never far from it. *A. guentheri* is not the young of any other species of *Aspidura*; because I have seen about one hundred specimens, and I have never seen one longer than about 6 inches, whilst amongst them were several young ones from $1\frac{1}{2}$ to 2 inches in length, retaining all the specific characters and coloration of their parents. A young *A. brachyorrhos*, the size of *A. guentheri* does not in any way differ from its parents or approach *A. guentheri*. *A. guentheri* differs from *A. brachyorrhos* markedly in the following respects—its small size and dark colour, in the number of its ventrals and subcaudals, its hexagonal-shaped and non-imbricate scales, its pointed snout, the extension backwards of the anterior frontal between the postfrontals, the separation of the preocular from the superciliary by the postfrontal, which runs into the eye, the larger size of the upper postorbital, and the scales it is in contact with. In twelve specimens of *A. guentheri* examined by me, the average number of ventrals was $109\frac{3}{4}$, subcaudals $20\frac{2}{3}$, totals $130\frac{5}{12}$, total length 5·83 inches, length of tail 0·72 inch. The lowest number of ventrals, 104, has the largest number of subcaudals =26.

Colombo, Ceylon.
August 29, 1876.

APPENDIX.

LIST OF ADDITIONS TO THE SOCIETY'S MENAGERIE

DURING THE YEAR

1876.

Jan. 1. 1 Pig-tailed Monkey (*Macacus nemestrinus*). Presented by the Rev. W. Ewart.
4. 1 Hooper Swan (*Cygnus ferus*), ♀. Presented by Mr. Montague Kingsford.
5. 1 Weeper Capuchin (*Cebus capucinus*). Presented by Mr. A. Kettner.
1 Levaillant's Cynictis (*Cynictis penicillata*). Presented by Viscount Mandeville. See P. Z. S. 1876, p. 255.
8. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. T. J. Dunn.
2 Darwin's Pucras Pheasants (*Pucrasia darwinii*), ♂ and ♀. Purchased.
12. 1 Palm-Squirrel (*Sciurus palmarum*). Presented by Mr. W. D. Barker, Jun.
1 Manyar Weaver-bird (*Ploceus manyar*). Presented by Mr. W. D. Barker, Jun.
2 Amaduvade Finches (*Estrelda amandava*). Presented by Mr. W. D. Barker, Jun.
2 Nutmeg-birds (*Munia undulata*). Presented by Mr. W. D. Barker, Jun.
15. 1 Emu (*Dromæus novæ-hollandiæ*). Presented by Mr. E. J. Dawes, F.Z.S.
1 Cinereous Sea-Eagle (*Haliaëtus albicilla*). Deposited.
17. 1 Common Marmoset (*Hapale jacchus*). Presented by Master F. Goodliffe.
1 Roseate Cockatoo (*Cacatua roseicapilla*). Deposited.
18. 1 Spotted Cavy (*Cœlogenys paca*). Purchased.
1 Central-American Agouti (*Dasyprocta punctata*). Purchased.
3 Brazilian Caracaras (*Polyborus brasiliensis*). Presented by Mr. W. Petty.
19. 1 Roseate Cockatoo (*Cacatua roseicapilla*). Presented by Dr. Bree, F.Z.S.
1 Coypu Rat (*Myopotamus coypus*). Purchased.
1 White-spotted Crake (*Porzana notata*). Purchased. Captured at sea off Cape Santa Maria. See P. Z. S. 1876, p. 255.
3 Geoffroy's Terrapins (*Platemys geoffroyana*). Purchased.
1 Maximilian's Terrapin (*Hydromedusa maximiliani*). Purchased.

Jan. 20. 2 Gannets (*Sula bassana*). Presented by Lieut. Col. Dugmore.
1 Leopard (*Felis pardus*). Presented by Mr. F. Elton.
1 Black Lemur (*Lemur macaco*). Presented by Mr. Dugald Gilchrist.
1 Rose-hill Parrakeet (*Platycercus eximius*). Presented by Mr. J. Smith.
24. 1 Black-faced Spider Monkey (*Ateles ater*). Presented by Capt. King.
2 Hawk's-billed Turtles (*Chelone imbricata*). Presented by Capt. King.
25. 1 Common Curlew (*Numenius arquatus*). Presented by Mr. Charles Clifton, F.Z.S.
1 Herring-Gull (*Larus argentatus*). Presented by Mr. Charles Clifton, F.Z.S.
1 Common Gull (*Larus canus*). Presented by Mr. Charles Clifton, F.Z.S.
2 Black-headed Gulls (*Larus ridibundus*). Presented by Mr. Charles Clifton, F.Z.S.
2 West-India Rails (*Aramides cayennensis*). Presented by Capt. Crozier.
26. 1 Darwin's Pucras Pheasant (*Pucrasia darwini*). Deposited.
2 Chukar Partridges (*Caccabis chukar*). Presented by Capt. F. Morison.
27. 3 Darwin's Pucras Pheasants (*Pucrasia darwini*). Deposited.
28. 1 Grey Ichneumon (*Herpestes griseus*). Presented by Mr. H. Churchill.
29. 1 Rhesus Monkey (*Macacus erythræus*), ♀. Presented by Mr. T. O. Davis.
2 Starred Tortoises (*Testudo stellata*). Presented by Mrs. Spau.
31. 1 Panda (*Ælurus fulgens*). Purchased. See P. Z. S. 1876, p. 255.
1 Red and Yellow Macaw (*Ara chloroptera*). Deposited.
2 Call-Ducks (*Anas boschas*). Presented by Mr. C. Clifton.

Feb. 1. 2 Snowy Egrets (*Ardea candidissima*). Purchased.
2. 1 Swainson's Lorikeet (*Trichoglossus swainsoni*). Presented by Mrs. G. F. Angus.
3. 1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by Mr. E. Darvell.
4. 1 Hobby (*Hypotriorchis subbuteo*). Presented by Mr. S. Baton.
1 Common Kestrel (*Tinnunculus alaudarius*). Presented by Mr. S. Baton.
5. 1 Red-crested Cardinal (*Paroaria cucullata*). Presented by Mr. P. W. Barlow, Jun.
2 Amadavade Finches (*Estrelda amandava*). Presented by Mr. P. W. Barlow, Jun.
7. 1 Blue-cheeked Barbet (*Megalæma asiatica*). Purchased.
8. 3 Burrowing Owls (*Pholeoptynx cunicularia*). Presented by Mr. A. O. Lumb.
9. 2 Golden Pheasants (*Thaumalea picta*), ♀. Received in exchange.
12. 1 Michie's Tufted Deer (*Lophotragus michianus*), ♂. Purchased. Ningpo district of China. See P. Z. S. 1876, p. 273, and p. 757, pl. LXXVI.
5 Darwin's Pucras Pheasants (*Pucrasia darwini*), 3 ♂ and 2 ♀. Deposited.
15. 1 Red-headed Pochard (*Fuligula ferina*), ♂. Presented by Capt. Salvin.

Feb. 16. 2 White-backed Pigeons (*Columba leuconota*). Purchased. See P. Z. S. 1876, p. 274.

1 Narrow-barred Pigeon (*Macropygia leptogrammica*). Purchased. See P. Z. S. 1876, p. 274.

2 White-necked Storks (*Ciconia episcopus*). Received in exchange.

2 Hill-Francolins (*Arboricola torqueola*). Presented by Mr. W. Jamrach.

1 Bay Bamboo Rat (*Rhizomys badius*). Presented by Mr. J. Wood-Mason. See P. Z. S. 1876, p. 274.

1 Square-spotted Snake (*Oxyrhopus doliatus*). Presented by Mr. J. L. Moore. From Pernambuco.

17. 5 Geoffroy's Doves (*Peristera geoffroii*), 3 ♂ and 2 ♀. Purchased.

1 Tiger Bittern (*Tigrisoma brasiliense*). Purchased.

1 Sociable Vulture (*Vultur auricularis*). Presented by Mr. J. C. Hobbs.

2 Cape-Francolins (*Francolinus capensis*). Presented by Mr. J C. Hobbs.

18. 1 Anderson's Kaleege (*Euplocamus andersoni*), ♀. Presented by Mr. W. Jamrach. See P. Z. S. 1876, p. 274.

3 Rufous-necked Weaver-birds (*Hyphantornis textor*), ♂. Presented by Mrs. Bates.

21. 1 Mouflon (*Ovis musimon*), ♂. Deposited.

1 Virginian Eagle-Owl (*Bubo virginianus*). Presented by Mr. H. Wright.

22. 1 Darwin's Pucras (*Pucrasia darwini*), ♀. Deposited.

1 Rose-crested Cockatoo (*Cacatua moluccensis*). Deposited.

2 Widgeon (*Mareca penelope*), ♂ and ♀. Presented by Mr. C. Clifton.

1 Common Wild Duck (*Anas boschas*). Presented by Mr. C. Clifton.

1 Lesser Black-backed Gull (*Larus fuscus*). Presented by Mr. C. Clifton.

3 Herring-Gulls (*Larus argentatus*). Presented by Mr. C. Clifton.

2 Common Gulls (*Larus canus*). Presented by Mr. C. Clifton.

3 Black-headed Gulls (*Larus ridibundus*). Presented by Mr. C. Clifton.

23. 1 Common Otter (*Lutra vulgaris*). Received in exchange.

27. 1 Zebu (*Bos indicus*), ♀. Born in the Gardens.

Mar. 2. 1 Brown Monkey (*Macacus brunneus*), ♂. Presented by Mr. T. G. F. Hesketh, F.Z.S. See P. Z. S. 1876, p. 332. From Siam.

1 Tyrant Eagle (*Spizaëtus tyrannus*). Presented by Lord Lilford, F.Z.S.

1 Many-zoned Hawk (*Melierax polyzonus*). Presented by Lord Lilford, F.Z.S.

2 Patagonian Caracaras (*Polyborus tharus*), pale variety. Presented by Lord Lilford, F.Z.S. See P. Z. S. 1876, p. 333, pl. xxv.

2 Adorned Terrapins (*Clemmys ornata*). Presented by Mr. H. H. Black. From Belize, Honduras.

1 American Box-Tortoise (*Terrapene carinata*). Presented by Mr. H. H. Black. From Belize, Honduras.

3. 2 Common Pintails (*Dafila acuta*), ♂ and ♀. Presented by Mr. E. C. Buck.

Mar. 3. 3 Spotted-billed Ducks (*Anas pœcilorhyncha*), 2 ♂ and 1 ♀. Presented by Mr. E. C. Buck.

18 Red-crested Whistling Ducks (*Fuligula rufina*), 12 ♂ and 6 ♀. Presented by Mr. E. C. Buck.

1 Cape-Dove (*Œna capensis*), ♂. Presented by Miss Borrer.

1 Secretary Vulture (*Serpentarius reptilivorus*). Deposited.

1 Ash-coloured Falcon (*Hypotriorchis concolor*). Presented by Mr. A. F. Allman. Captured in the Mozambique Channel. See P. Z. S. 1876, p. 333.

4 Adorned Terrapins (*Clemmys ornata*). Presented by Capt. Cooper, R.N.

4. 1 Common Buzzard (*Buteo vulgaris*). Presented by Mr. W. Binder.

6. 1 Great Frigate-bird (*Fregata aquila*). Purchased.

3 American Black-backed Geese (*Sarcidiornis carunculata*). Purchased. From Maranham. See P. Z. S. 1876, p. 695, pl. LXVIII.

1 Crested Hangnest (*Ostinops cristatus*). Purchased.

1 Gull-billed Tern (*Sterna anglica*). Purchased.

1 Cayenne Lapwing (*Vanellus cayennensis*). Purchased.

1 Yellow-footed Rock-Kangaroo (*Petrogale xanthopus*), ♀. Born in the Gardens.

8. 2 Forster's Milvagos (*Milvago australis*). Presented by Lord Lilford, F.Z.S.

1 Ogilby's Rat-Kangaroo (*Hypsiprymnus ogilbyi*), ♀. Purchased.

9. 1 Vulpine Phalanger (*Phalangista vulpina*). Purchased.

10. 1 Jackal Buzzard (*Buteo jacal*). Deposited.

1 Ring-necked Parrakeet (*Palæornis torquata*). Purchased.

171 Sand-Lizards (*Lacerta agilis*). Presented by H. Negretti, Esq. From Italy.

11. 1 ¾-breed Zebu (between *Bos indicus* and hybrid *B. frontalis*), ♀. Bred in the Gardens.

1 Araucanian Pigeon (*Columba araucana*). Presented by Lord Lilford, F.Z.S.

12. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Miss L. H. Cowles.

14. 1 Collared Fruit-Bat (*Cynonycteris collaris*). Born in the Gardens.

15. 1 Rhesus Monkey (*Macacus erythræus*), ♂. Presented by Mr. Robert L. Ogilby.

16. 1 White-cheeked Capuchin (*Cebus lunatus*), ♂. Presented by Dr. Lynn.

1 Knot (*Tringa canutus*). Presented by Mr. C. Clifton.

1 Aztec Conuro (*Conurus aztec*). Purchased.

2 All-green Parrakeets (*Brotogerys tiriacula*). Purchased.

18. 1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by Mr. J. Shortland.

2 Suricates (*Suricata zenik*), ♂ and ♀. Presented by Mr. J. Thorburn.

20. 2 Green Monkeys (*Cercopithecus callitrichus*), 2 ♂. Presented by Mr. John E. Liardet.

1 Common Badger (*Meles taxus*). Presented by Mr. John E. Liardet.

1 Common Fox (*Canis vulpes*). Presented by Mr. John E. Liardet.

21. 1 Hobby (*Hypotriorchis subbuteo*). Presented by Mr. John Barnet.

1 American Jabiru (*Mycteria americana*). Purchased.

Mar. 23. 1 Ruddy Ichneumon (*Herpestes smithii*). Presented by Mr. C. J. Maude.
1 Sclater's Muntjac (*Cervulus sclateri*). Deposited.
1 Herring-Gull (*Larus argentatus*). Presented by Mrs. Batty.
27. 1 Lesser White-nosed Monkey (*Cercopithecus petaurista*), ♀. Presented by Mr. F. Ward.
28. 1 Impeyan Pheasant (*Lophophorus impeyanus*), ♀. Deposited.
29. 1 South-American Flamingo (*Phœnicopterus igni-palliatus*). Purchased. From Lake Titicaca. See P. Z. S. 1876, p. 333.
3 Sirens (*Siren lacertina*). Presented by Mr. G. E. Maingault. See P. Z. S. 1876, p. 333.
2 Wheatears (*Saxicola œnanthe*). Purchased.

April 1. 1 Common Marmoset (*Hapale jacchus*). Presented by Mrs. Cleaver.
2. 2 Cuming's Octodons (*Octodon cumingi*). Born in the Gardens.
3. 3 Ring-necked Parrakeets (*Palæornis torquata*). Presented by Mrs. A. Moore.
1 Mandrill (*Cynocephalus mormon*), ♂. Presented by Lieut. V. L. Cameron. From the Gaboon.
2 Yellow Baboons (*Cynocephalus babouin*), ♂ and ♀. Presented by Lieut. V. L. Cameron. From the Kwanza. See P. Z. S. 1876, p. 413.
1 Sooty Mangabey (*Cercocebus fuliginosus*), ♀. Presented by Lieut. V. L. Cameron. From the Gaboon. See P. Z. S. 1876, p. 413.
1 Monteiro's Galago (*Galago monteiri*). Presented by Lieut. V. L. Cameron. From Bailunda. See P. Z. S. 1876, p. 413.
1 African Civet Cat (*Viverra civetta*). Presented by Lieut. V. L. Cameron. From the Kwanza. See P. Z. S. 1876, p. 413.
1 Servaline Cat (*Felis servalina*). Presented by Lieut. V. L. Cameron. From the Kwanza. See P. Z. S. 1876, p. 413.
1 Banded Ichneumon (*Herpestes fasciatus*). Presented by Lieut. Cameron. From the Kwanza. See P. Z. S. 1876, p. 413.
1 Senegal Touracou (*Corythaix persa*). Presented by Lieut. V. L. Cameron.
1 Angolan Vulture (*Gypohierax angolensis*). Presented by Lieut. V. L. Cameron. From the Kwanza. See P. Z. S. 1876, p. 413.
1 Marabou Stork (*Leptoptilus crumeniferus*). Presented by Mr. Amzalak, of Angola. From the Kwanza.
3 Broad-fronted Crocodiles (*Crocodilus frontatus*). Presented by Lieut. V. L. Cameron. From the Congo. See P. Z. S. 1876, p. 413.
2 Chestnut-backed Colies (*Colius castanonotus*). Presented by Mr. H. C. Tait, C.M.Z.S. From the river Daude, W. Africa. See P. Z. S. 1876, p. 413, pl. xxxv.
5. 3 Wild Boars (*Sus scrofa*). Born in the Gardens.
6. 1 Little Grebe (*Podiceps minor*). Presented by Dr. S. J. F. Stafford.
7. 1 Sclater's Muntjac (*Cervulus sclateri*), ♂. Presented by Mr. W. H. Medhurst.
1 Sonnerat's Jungle-Fowl (*Gallus sonnerati*), ♀. Deposited.
1 Shining Buzzard-Hawk (*Asturina nitida*). Purchased.
1 Rusty Buzzard (*Urubitinga meridionalis*). Purchased.
8. 1 Arabian Baboon (*Cynocephalus hamadryas*), ♀. Presented by Mr. G. J. Atkins.

April 8. 2 Secretary Vultures (*Serpentarius reptilivorus*). Deposited.
9. 1 Silky Hangnest (*Amblyrhamphus holosericeus*). Presented by Mrs. Arabin.
12. 1 Indian Wild Dog (*Canis primævus*), ♂. Presented by Col. A. C. M'Master. From the Deccan.
1 Common Paradoxure (*Paradoxurus typus*). Presented by Col. A. C. M'Master. From the Deccan.
1 Small Hill-Mynah (*Gracula religiosa*). Presented by Mrs. Smithers.
13. 4 Trout (*Salmo fario*). Presented by Mr. D. Banks.
1 Golden Tench (*Tinca vulgaris*). Presented by Mr. D. Banks.
14. 2 Common Boas (*Boa constrictor*). Presented by Mr. G. W. Des Vœux.
15. 1 Yellow-faced Amazon (*Chrysotis xanthops*). Presented by Mrs. Crawley.
16. 1 Common Eel (*Anguilla vulgaris*). Presented by Dr. A. H. Smee.
1 Great Pipe-fish (*Syngnathus acus*). Presented by Dr. A. H. Smee.
17. 1 Coati (*Nasua nasica*). Purchased.
2 Silky Marmosets (*Midas rosalia*). Purchased.
1 Scaup Duck (*Fuligula marila*), ♂. Presented by Mr. H. Colliver.
19. 5 Specious Pigeons (*Columba speciosa*). Purchased.
2 Cirl Buntings (*Emberiza cirlus*), ♂ and ♀. Purchased.
20. 1 Common Otter (*Lutra vulgaris*). Presented by Mr. J. Herbert.
1 Yarrell's Curassow (*Crax carunculata*), ♂. Presented by Mr. Aug. Ceiyoto.
21. 1 Grey Squirrel (*Sciurus cinereus*), ♀. Presented by Mr. M. E. Symons.
22. 1 Weeper Capuchin (*Cebus capucinus*), ♂. Presented by Major F. J. R. Seaver.
1 Gray's Paradoxure (*Paradoxurus grayi*), ♂. Presented by Dr. Skipton.
2 Common Thicknees (*Œdicnemus crepitans*). Presented by Mr. J. E. Harting, F.Z.S.
23. 1 Molucca Deer (*Cervus moluccensis*), ♀. Born in the Menagerie.
25. 1 Collared Fruit-Bat (*Cynonycteris collaris*). Born in the Menagerie.
4 Blackish Sternotheres (*Sternothærus subniger*). Presented by Mr. Lionel Hart.
1 Entellus Monkey (*Semnopithecus entellus*), ♀. Purchased.
26. 2 Bennett's Cassowaries (*Casuarius bennetti*). Presented by the Rev. George Brown, C.M.Z.S. See P. Z. S. 1876, p. 413.
1 Lyre-bird (*Menura superba*). Purchased.
2 Protei (*Proteus anguinus*). Presented by Sir Bartle E. Frere. From the Cave of Adelsburg.
27. 1 Common Badger (*Meles taxus*), ♂. Presented by Mr. W. Barneby.
1 Black-backed Porphyrio (*Porphyrio melanotus*). Presented by Capt. John Gibb. Captured at sea off New Zealand.
29. 1 Bennett's Gazelle (*Gazella bennettii*), ♀. Presented by Lieut. J. R. King.
3 Common Boas (*Boa constrictor*). Purchased.
1 White-fronted Capuchin (*Cebus albifrons*), ♂. Purchased. From Cartagena.
1 White-throated Capuchin (*Cebus hypoleucus*), ♂. Purchased. From Rio Magdalena.

Apr. 29. 1 Hoffmann's Sloth (*Cholopus hoffmanni*). Purchased. From Panama.

6 Virginian Colins (*Ortyx virginiana*), 3 ♂ and 3 ♀. Purchased. From Jamaica.

1 Wrinkled Terrapin (*Clemmys rugosa*). Purchased. From Jamaica.

30. 1 Dusty Ichneumon (*Herpestes pulverulentus*). Presented by Dr. Alex. Jennings.

1 Broad-fronted Crocodile (*Crocodilus frontatus*). Presented by Dr. Alex. Jennings.

May 1. 1 Black-faced Spider Monkey (*Ateles ater*), ♀. Purchased.

1 Hoffmann's Sloth (*Cholopus hoffmanni*). Purchased.

3 Brown Howlers (*Mycetes fuscus*). Deposited.

1 Brazilian Tree-Porcupine (*Cercolabes prehensilis*). Deposited.

2. 1 Grey Ichneumon (*Herpestes griseus*). Presented by Mr. H. Worth.

3. 2 Leopards, young (*Felis pardus*). Presented by Mr. G. Beale Brown, 1st W.I. Reg.

4. 1 Mouflon (*Ovis musimon*), ♀. Born in the Menagerie.

5 Water-Ouzels (*Cinclus aquaticus*). Presented by Mr. Fred. Swabey.

5. 1 Herring-Gull (*Larus argentatus*). Presented by Mr. Brazenor.

1 Black-headed Gull (*Larus ridibundus*). Presented by Mr. Brazenor.

6. 1 Common Raccoon (*Procyon lotor*). Deposited.

8. 1 Vervet Monkey (*Cercopithecus lalandii*), ♂. Presented by Master O. Billinghurst.

9. 1 American Wolf (*Canis occidentalis*). Received in exchange.

1 Cape-Zorilla (*Ictonyx zorilla*). Received in exchange.

1 Tooth-billed Pigeon (*Didunculus strigirostris*). Purchased. See P. Z. S. 1876, p. 462.

1 Hoffmann's Sloth (*Cholopus hoffmanni*). Born in the Menagerie.

1 Brazilian Teal (*Querquedula brasiliensis*), ♀. Purchased.

10. 1 Leucoryx Antelope (*Oryx leucoryx*). Deposited.

1 Red-crested Cardinal (*Paroaria cucullata*). Presented by Miss Warre.

6 Chilian Pintails (*Dafila spinicauda*). Bred in the Gardens.

11. 2 Secretary Vultures (*Serpentarius reptilivorus*). Presented by Mr. M. G. Angel.

1 Egyptian Cobra (*Naia haje*). Presented by the Rev. G. H. R. Fisk, C.M.Z.S.

1 Common Adder (*Vipera berus*). Presented by Mr. John Hartland.

5 Variegated Sheldrakes (*Tadorna variegata*). Bred in the Gardens.

12. 1 Passerine Owl (*Glaucidium passerinum*). Presented by Mr. H. M. G. Bird.

13. 1 Maholi Galago (*Galago maholi*), ♂. Presented by Mr. R. A. Zeederberg, M.D.

1 Horseshoe Snake (*Zamenis hippocrepis*). Presented by Mr. C. Bartlett. From near Gibraltar.

15. 1 Purple-faced Monkey (*Semnopithecus leucoprymnus*). Presented by Mr. A. J. Keason.

16. 2 Hairy Armadillos (*Dasypus villosus*). Born in the Menagerie.

18. 1 Weeper Capuchin (*Cebus capucinus*), ♀. Deposited.

May 18. 1 Great Kangaroo (*Macropus giganteus*), ♂. Born in the Menagerie.
1 Thar Goat (*Capra iemlaica*), ♂. Born in the Menagerie.
2 Javan Fish-Owls (*Ketupa javanensis*). Received in exchange.
1 Diuca Finch (*Diuca grisea*). Purchased.
2 Pileated Song-Sparrows (*Zonotrichia pileata*). Purchased.
2 Gay's Finches (*Phrygilus gayi*). Purchased.
1 Alaudine Finch (*Phrygilus alaudinus*). Purchased.
1 Orchard-Finch (*Phrygilus fruticeti*). Purchased.
1 Falkland-Island Thrush (*Turdus falklandicus*). Purchased.
1 Black-faced Ibis (*Geronticus melanotis*). Purchased.
20. 1 White-backed Trumpeter (*Psophia leucoptera*). Presented by Mr. H. Stacey Marks, F.Z.S. See P. Z. S. 1876, p. 463.
2 Hawfinches (*Coccothraustes vulgaris*), ♂ and ♀. Purchased.
1 Red-backed Shrike (*Lanius collurio*). Purchased.
1 Geoffroy's Dove (*Peristera geoffroyi*). Bred in the Gardens.
21. 2 Common Jackals (*Canis aureus*). Presented by Mr. W. J. Haddock.
4 Chinchillas (*Chinchilla lanigera*). Born in the Menagerie.
1 Brazilian Land-Tortoise (*Testudo tabulata*). Deposited.
1 Dark-green Maize-eater (*Pseudoleistes virescens*). Purchased.
22. 1 Common Barn-Owl (*Strix flammea*). Presented by Mrs. Knight.
23. 1 Silver Pheasant (*Euplocamus nycthemerus*), ♀. Presented by Mr. W. Miles.
26. 1 Silky Marmoset (*Midas rosalia*), ♂. Purchased.
1 Huanaco (*Lama huanacos*), ♂. Purchased.
3 Chinchillas (*Chinchilla lanigera*). Purchased.
1 Azara's Fox (*Canis azaræ*), ♀. Purchased.
1 Blue-fronted Amazon (*Chrysotis amazonica*). Presented by Miss M. Jukes.
29. 1 Vulpine Phalanger (*Phalangista vulpina*). Presented by Mr. C. H. A. Forbes.
2 Barnard's Parrakeets (*Platycercus bernardi*). Deposited.
30. 1 Bonnet-Monkey (*Macacus radiatus*). Born in the Menagerie.
1 Ocelot (*Felis pardalis*). Presented by Mr. W. A. Sumner.
1 White-bellied Sea-Eagle (*Haliaëtus leucogaster*). Purchased.
31. 1 Black-faced Spider Monkey (*Ateles ater*), ♀. Purchased.
2 Globose Curassows (*Crax globicera*), ♂ and ♀. Purchased, From Cartagena. See P. Z. S. 1876, p. 463.
1 Derbian Screamer (*Chauna derbiana*). Purchased. From Cartagena.
1 Rose-billed Tree-Duck (*Dendrocygna autumnalis*). Purchased.
1 White-throated Capuchin (*Cebus hypoleucos*), ♂. Purchased.
4 Fawn-coloured Field-Mice (*Mus cervicolor*). Presented by Col. C. S. Sturt, C.M.Z.S. See P. Z. S. 1876, p. 463.
1 Soft-billed Duck (*Hymenolæmus malacorhynchus*), ♀. Presented by Acclim. Soc. of Otago, N. Z. See P. Z. S. 1876, p. 463.

June 1. 1 Blue Jay (*Cyanocitta cristata*). Presented by Mr. E. Hawkins.
1 Chinese Jay-Thrush (*Garrulax chinensis*). Presented by Mr. E. Hawkins.
2. 1 Suricate (*Suricata zenik*). Received in exchange.
5. 1 Rose-crested Cockatoo (*Cacatua moluccensis*). Presented by Mr. G. J. Webb.

June 5. 9 Spotted-billed Ducks (*Anas pæcilorhyncha*). Bred in the Gardens.
6. 1 Common Wolf (*Canis lupus*). Presented by Viscount Hill, F.Z.S.
2 Black Spur-winged Geese (*Plectropterus niger*). Received from Lieut.-General A. V. Cunyngham. From Zanzibar. See P. Z. S. 1877, pl. VII.
1 Great Barbet (*Megalæma virens*). Purchased.
7. 1 Mexican Deer (*Cervus mexicanus*), ♂. Presented by Mr. T. B. Forward.
2 Galapagan Tortoise (*Testudo elephantopus*). Deposited. See P. Z. S. 1876, p. 693.
1 Rhomb-marked Snake (*Psammophylax rhombeatus*). Presented by the Rev. G. H. R. Fisk. From near Cape-town.
7 Chiloe Wigeon (*Mareca chiloensis*). Bred in the Gardens.
8. 1 Black-faced Spider Monkey (*Ateles ater*), ♂. Purchased.
1 Humboldt's Lagothrix (*Lagothrix humboldti*). Purchased.
1 Ocelot (*Felis pardalis*). Purchased.
1 Tayra (*Galictis barbara*). Purchased.
1 Golden Agouti (*Dasyprocta aguti*). Purchased.
3 Flamingoes (*Phœnicopterus antiquorum*). Purchased.
4 Black Larks (*Melanocorypha yeltoniensis*). Purchased.
6 Japanese Teal (*Querquedula formosa*), 3 ♂ and 3 ♀. Purchased.
2 Grey-breasted Parrakeets (*Bolborhynchus monachus*). Presented by Miss Thomson.
1 Horned Viper (*Vipera cornuta*). Presented by Rev. G. H. R. Fisk. From the Cape.
9. 2 Indian White Cranes (*Grus leucogeranus*). Purchased.
1 Macaque Monkey (*Macacus cynomolgus*). Deposited.
10. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by Mr. R. W. Sanders.
1 White-throated Capuchin (*Cebus hypoleucus*). Presented by Mr. L. E. Jonas.
1 Coati (*Nasua nasica*). Deposited.
2 Emus (*Dromæus novæ hollandiæ*). Deposited.
2 Galapagan Tortoises (*Testudo elephantopus*). Deposited.
1 Glass Snake (*Pseudopus pallasi*). Deposited.
12. 2 Geoffroy's Doves (*Peristera geoffroii*). Bred in the Gardens.
1 Moor-Monkey (*Semnopithecus maurus*), ♀. Purchased.
1 Bay Antelope (*Cephalophus dorsalis*), ♀. Purchased.
1 Black Sternothere (*Sternothærus niger*). Purchased.
13. 2 Black-eared Marmosets (*Hapale penicillata*). Presented by Mr. Geo. Newton.
1 Black-faced Spider Monkey (*Ateles ater*), ♀. Purchased.
1 Puma (*Felis concolor*), ♀. Purchased.
1 Cariama (*Cariama cristata*). Presented by Captain W. C. Chapman, R.N.
1 Red-backed Shrike (*Lanius collurio*), ♀. Purchased.
1 Chaffinch (*Fringilla cœlebs*). Presented by Mr. E. Roberts.
16. 2 Vulturine Guinea Fowls (*Numida vulturina*). Deposited.
3 Chaplain Crows (*Corvus advena*). Presented by Mr. J. Huntley. From Fao, Persian Gulf. See P. Z. S. 1876, p. 693, pl. lxvi.
1 Rose-ringed Parrakeet (*Palæornis docilis*), ♀. Presented by Mrs. Haywood.
1 Hyacinthine Macaw (*Ara hyacinthina*). Presented by Mr. Hugh Wilson.

June 16. 1 West-Indian Rail (*Aramides cayennensis*). Purchased.

1 Common Boa (*Boa constrictor*). Purchased.

17. 1 Tree-Boa (*Corallus hortulanus*). Purchased.

19. 1 Eland (*Oreas canna*), ♂. Born in the Gardens.

1 Sclater's Muntjac (*Cervulus sclateri*), ♂. Deposited.

2 Darwin's Pucras (*Pucrasia darwini*), ♂ and ♀. Deposited.

20. 1 Malbrouck Monkey (*Cercopithecus cynosurus*), ♀. Presented by Dr. Stirling.

2 Tigers (*Felis tigris*). Presented by Dr. Marchant Jones. From Amoy, China. See P. Z. S. 1876, p. 694.

1 Northern Buzzard (*Buteo borealis*). Presented by Capt. W. J. Tibbs, 98th Regt.

22. 1 Pine-Marten (*Martes abietum*). Presented by F. Nicholson, Esq., F.Z.S.

5 Red-headed Weaver-birds (*Foudia madagascariensis*). Presented by the Misses S. E. P. and A. Warre.

1 Cape Weaver-bird (*Hyphantornis capensis*). Presented by the Misses S. E. P. and A. Warre.

1 Paradise Whydah-bird (*Vidua paradisea*). Presented by the Misses S. E. P. and A. Warre.

3 Red-bellied Waxbills (*Estrelda rufiventris*). Presented by the Misses S. E. P. and A. Warre.

1 Java Sparrow (*Padda oryzivora*). Presented by the Misses S. E. P. and A. Warre.

1 Common Linnet (*Linaria cannabina*). Presented by the Misses S. E. P. and A. Warre.

24. 1 Gerrard's Squirrel (*Sciurus gerrardi*). Purchased. From Cartagena. See P. Z. S. 1876, p. 694.

1 Central American Agouti (*Dasyprocta punctata*). Purchased. From Cartagena.

1 Common Ocelot (*Felis pardalis*), ♂. Purchased. From Rio Magdalena.

1 Red-and-yellow Macaw (*Ara chloroptera*). Purchased. From Cartagena.

2 Red-billed Tree-Ducks (*Dendrocygna autumnalis*). Purchased. From Cartagena.

1 Hicotee Terrapin (*Clemmys decussata*). Purchased. From Jamaica.

1 Common Waxbill (*Estrelda cinerea*). Presented by Miss Barlow.

26. 11 Lineated Pheasants (*Euplocamus lineatus*). Bred in the Gardens.

9 Amherst's Pheasants (*Thaumalea amherstiæ*). Bred in the Gardens.

9 Gold Pheasants (*Thaumalea picta*). Bred in the Gardens.

2 Peacock Pheasants (*Polyplectron chinquis*). Bred in the Gardens.

27. 1 Bronze-winged Pigeon (*Phaps chalcoptera*). Bred in the Gardens.

28. 1 Sumatran Rhinoceros (*Rhinoceros sumatrensis*). Purchased. See P. Z. S. 1876, p. 694.

4 Phalangers (*Belideus ariel*). Presented by Mr. O. C. Stone. See P. Z. S. 1876, p. 694.

1 Cape-Buffalo (*Bubalus caffer*). Deposited.

July 1. 2 African Cheetahs (*Felis jubata*). Presented by T. L. M. Cartwright, Esq., F.Z.S.

July 2. 2 Peregrine Falcons (*Falco peregrinus*). Presented by Mr. Herbert Wood.
3 Summer-Ducks (*Aix sponsa*). Bred in the Gardens.
3 Rosy-billed Ducks (*Metopiana peposaca*). Bred in the Gardens.
1 Grey Parrot (*Psittacus erithacus*). Purchased.
3. 2 Silky Hangnests (*Amblyrhamphus holosericeus*). Bred in the Gardens.
1 Macaque Monkey (*Macacus cynomolgus*). Presented by Mr. G. Hollis.
4. 1 Moorish Tortoise (*Testudo mauritanica*). Presented by Mr. Milne.
5. 1 Great-headed Maleo (*Megacephalon maleo*). Purchased.
1 Bornean Fireback Pheasant (*Euplocamus nobilis*), ♀. Purchased.
2 Common Crowned Pigeons (*Goura coronata*). Purchased.
2 Black-backed Geese (*Sarcidiornis melanonota*), ♂ and ♀. Purchased. See P. Z. S. 1876, p. 694, pl. LXVII.
1 Saddle-billed Stork (*Xenorhynchus senegalensis*). Purchased.
1 Indian Python (*Python molurus*). Purchased.
1 Roseate Cockatoo (*Cacatua roseicapilla*). Presented by Misses Campbell.
1 Hawfinch (*Coccothraustes vulgaris*). Deposited.
7. 2 One-streaked Hawks (*Melierax monogrammicus*). Purchased.
8. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by Miss Preston.
2 Common Cormorants (*Phalacrocorax carbo*). Received in exchange.
10. 3 Shoveller Ducks (*Spatula clypeata*). Bred in the Gardens.
2 Summer-Ducks (*Aix sponsa*). Bred in the Gardens.
2 Royal Pythons (*Python regius*). Presented by Mr. J. J. Kendal.
11. 2 Striped Hyænas (*Hyæna striata*). Purchased.
1 Alligator (*Alligator mississippiensis*). Purchased.
12. 2 Vulpine Phalangers (*Phalangista vulpina*). Born in the Gardens.
1 Talapoin Monkey (*Cercopithecus talapoin*). Purchased.
2 American White Cranes (*Grus americana*). Purchased.
1 Green-winged Trumpeter (*Psophia viridis*). Purchased.
2 Celebean Rails (*Rallus celebensis*). Purchased.
14. 1 Greater Sulphur-crested Cockatoo (*Cacatua galerita*). Presented by Mrs. Baliol Scott.
1 Common Squirrel (*Sciurus vulgaris*). Presented by Mr. à Court Repington.
1 Reeves's Muntjac (*Cervulus reevesi*). Born in the Gardens.
18. 1 Common Rhea (*Rhea americana*). Purchased.
1 Naked-throated Bell-bird (*Chasmorhynchus nudicollis*). Purchased.
2 Yellow Hangnests (*Cassicus persicus*). Purchased.
2 White-bellied Thrushes (*Turdus albiventris*). Purchased.
2 Brazilian Teal (*Querquedula brasiliensis*), ♂ and ♀. Purchased.
2 Snowy Egrets (*Ardea candidissima*). Purchased.
2 South-American Little Bitterns (*Butorides cyanurus*). Purchased.
2 Sulphury Tyrant Birds (*Pitangus sulphuratus*). Purchased.

July 18. 2 Silky Cow-birds (*Molothrus cyaneus*). Purchased.

1 Silver-blue Tanager (*Tanagra cana*). Purchased.

1 Blue Grosbeak (*Guiraca cyanea*). Purchased.

1 Ocelot (*Felis pardalis*), ♀. Presented by Mr. Zurcher.

19. 2 Central-American Agouti (*Dasyprocta punctata*). Purchased.

2 Australian Bustards (*Eupodotis australis*), ♂ and ♀. Deposited.

12 Jameson's Gulls (*Larus jamesoni*). Presented by Mr. A. H. Jamrach.

1 Shining Parrakeet (*Pyrrhulopsis splendens*). Purchased.

1 White-backed Pigeon (*Columba leuconota*). Deposited.

2 Diuca Finches (*Diuca grisea*). Bred in the Gardens.

1 American Thrush (*Turdus migratorius*). Presented by D. J. Kemp, Esq.

20. 2 Common Ravens (*Corvus corax*). Deposited.

13 Gold Pheasants (*Thaumalea picta*). Bred in the Gardens.

9 Amherst Pheasants (*Thaumalea amherstiæ*). Bred in the Gardens.

2 Lineated Pheasants (*Euplocamus lineatus*). Bred in the Gardens.

1 Temminck's Tragopan (*Ceriornis temmincki*). Bred in the Gardens.

4 Silky Marmosets (*Midas rosalia*). Purchased.

1 King Vulture (*Gypagus papa*). Purchased.

1 Crested Curassow (*Crax alector*). Purchased.

1 Razor-billed Curassow (*Mitua tuberosa*). Purchased.

1 Naked-throated Bell-bird (*Chasmorhynchus nudicollis*). Purchased.

1 Ariel Toucan (*Ramphastos ariel*). Purchased.

1 Green-billed Toucan (*Ramphastos dicolorus*). Purchased.

4 Sayaca Tanagers (*Tanagra sayaca*). Purchased.

6 Festive Tanagers (*Calliste festiva*). Purchased.

9 Green-headed Tanagers (*Calliste tricolor*). Purchased.

6 All-green Tanagers (*Chlorophonia viridis*). Purchased.

2 Violet Tanagers (*Euphonia violacea*). Purchased.

1 Brown Howler (*Mycetes fuscus*). Purchased.

1 Ocelot (*Felis pardalis*). Purchased.

2 White-throated Capuchins (*Cebus hypoleucos*), ♂ and ♀. Purchased.

1 Black-handed Spider Monkey (*Ateles melanochir*), ♂. Deposited.

1 Marimonda Spider Monkey (*Ateles belzebuth*), ♀. Deposited.

1 Coati (*Nasua nasica*). Presented by the Hon. C. W. Finch.

3 Passerine Owls (*Glaucidium passerinum*). Purchased.

21. 2 Lesser White-nosed Monkeys (*Cercopithecus petaurista*), ♂ and ♀. Presented by Mr. Miles.

1 Brown Bear (*Ursus arctos*). Purchased. See P. Z. S. 1876, p. 695.

1 Tennent's Squirrel (*Sciurus tennenti*). Purchased.

1 Mongoose Lemur (*Lemur mongoz*). Purchased.

23. 1 Eland (*Oreas canna*), ♂. Bred in the Gardens.

3 Common Kestrels (*Tinnunculus alaudarius*). Presented by Mr. A. Knight.

24. 2 Tigers (*Felis tigris*), ♂ and ♀. Presented by H.R.H. the Prince of Wales.

2 Indian Leopards (*Felis pardus*). Presented by H.R.H. the Prince of Wales.

July 24. 1 Indian Elephant (*Elephas indicus*), ♀. Presented by H.R.H. the Prince of Wales.
2 Indian Antelopes (*Antelope cervicapra*), ♂ ♂. Presented by H.R.H. the Prince of Wales.
2 Horned Tragopans (*Ceriornis satyra*), ♂ and ♀. Presented by H.R.H. the Prince of Wales.
1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. L. J. Drew.
4 Chilian Pintail (*Dafila spinicauda*). Bred in the Gardens.
4 Common Teal (*Querquedula crecca*). Bred in the Gardens.
25. 1 Axis Deer (*Cervus axis*), ♂. Born in the Gardens.
26. 1 Anubis Baboon (*Cynocephalus anubis*), ♂. Received in exchange.
1 Mocassin Snake (*Tropidonotus fasciatus*). Purchased.
1 Argentine Tortoise (*Testudo argentina*). Purchased.
1 Brazilian Tortoise (*Testudo tabulata*). Purchased.
27. 2 Ring-necked Parrakeets (*Palæornis torquata*). Presented by Mrs. Doxat.
2 Australian Crows (*Corvus australis*). Received in exchange.
2 Crested Guinea Fowls (*Numida cristata*). Bred in the Gardens. See P. Z. S. 1876, p. 695.
31. 1 Small Indian Mynah (*Gracula religiosa*). Presented by Mrs. Frederic Watt.

Aug. 1. 1 Raccoon-like Dog (*Nyctereutes procynides*), ♀. Presented by Capt. Burgoyne. From China. See P. Z. S. 1876, p. 695.
1 Common Hangnest (*Icterus vulgaris*). Purchased. From Mexico.
1 Sorry Thrush (*Turdus tristis*). Purchased. From Mexico.
2 Yellow-headed Troupials (*Xanthocephalus icterocephalus*). Purchased. From Mexico.
1 Black-headed Grosbeak (*Hedymeles melanocephalus*). Purchased. From Mexico.
1 Orchard-Hangnest (*Icterus spurius*). Purchased. From Mexico.
2 Blood-stained Finches (*Carpodacus hæmorrhous*). Purchased. From Mexico.
1 Wagler's Troupial (*Icterus wagleri*). Purchased. From Mexico.
1 Blue Grosbeak (*Guiraca cærulea*). Purchased. From Mexico.
2 Rich Black Troupials (*Lampropsar dives*). Purchased. From Mexico.
2. 1 Senegal Touracou (*Corythaix persa*). Purchased.
1 Tuberculated Lizard (*Iguana tuberculata*). Purchased.
4 Scorpion Mud-Terrapins (*Cinosternon scorpioides*). Presented by Mr. S. Devenish.
4. 1 White-fronted Capuchin (*Cebus albifrons*), ♂. Presented by Mr. H. B. Warren.
1 Yellow-shouldered Amazon (*Chrysotis ochroptera*). Presented by Mr. H. B. Warren.
5. 1 Brown Coati (*Nasua nasica*). Presented by the Rev. C. Corfield.
1 Common Magpie (*Pica caudata*). Deposited.
7 Common Guillemots (*Uria troile*). Presented by Sir H. Dalrymple, Bart.
1 Kittiwake-Gull (*Rissa tridactyla*). Presented by Sir H. Dalrymple, Bart.
6. 2 Hairy Armadillos (*Dasypus villosus*). Born in the Gardens.
8. 5 Gold Pheasants (*Thaumalea picta*). Bred in the Gardens.

Aug. 8. 1 Amherst Pheasant (*Thaumalea amherstiæ*). Bred in the Gardens.

1 Siamese Pheasant (*Euplocamus prælatus*). Bred in the Gardens.

9. 1 Leopard Tortoise (*Testudo pardalis*). Deposited.

10. 1 Crested Pigeon (*Ocyphaps lophotes*). Bred in the Gardens.

1 Porto-Rico Pigeon (*Columba corensis*). Bred in the Gardens.

2 Black Iguanas (*Metopoceros cornutus*). Purchased.

11. 1 Ruddy Ichneumon (*Herpestes smithii*). Presented by Miss Bidder.

12. 1 Grizzly Bear (*Ursus ferox*). Purchased. From California. See P. Z. S. 1876, p. 695.

2 Booted Eagles (*Aquila pennata*). Deposited.

3 Common Bustards (*Otis tarda*). Deposited.

14. 1 Kit Fox (*Canis velox*). Presented by Surgeon-Major Archer. From Honduras.

1 Rufous-vented Guan (*Penelope cristata*). Purchased. From Nicaragua.

1 Fugitive Snake (*Dromicus fugitivus*). Purchased. From St. Lucia, W. I.

1 Hawk-billed Turtle (*Chelone imbricata*). Purchased.

1 Common Cuckoo (*Cuculus canorus*). Presented by Mr. J. Paddy.

15. 1 Egyptian Vulture (*Neophron percnopterus*). Deposited.

2 White-crested Laughing Thrushes (*Garrulax leucolophus*). Purchased. See P. Z. S. 1876, p. 695.

1 Yellow-billed Liothrix (*Liothrix luteus*). Presented by Mr. W. Prehn.

2 Common Barn-Owls (*Strix flammea*). Presented by Miss Hicks.

18. 1 Spotted Eagle (*Aquila nævia*). Presented by Mr. W. Prodham.

1 Bengal Pitta (*Pitta bengalensis*). Purchased. See P. Z. S. 1876, p. 696.

19. 1 Sun-Bittern (*Eurypyga helias*). Purchased.

21. 2 Green Monkeys (*Cercopithecus callitrichus*), 2 ♂. Presented by Mr. H. Richardson.

2 Russell's Vipers (*Vipera russelli*). Presented by Mr. H. Saunders.

22. 1 Sloth-Bear (*Melursus labiatus*), ♀. Presented by Lieuts. Royle and Gray, R.N.

3 Dark Green Snakes (*Zamenis atrovirens*). Presented by Lord Lilford, R.N., F.Z.S. From Dalmatia.

1 Leopardine Snake (*Zamenis leopardinus*). Presented by Lord Lilford, R.N., F.Z.S. From Dalmatia.

4 Dahl's Snakes (*Zamenis dahli*). Presented by Lord Lilford, R.N., F.Z.S. From Dalmatia.

23. 1 Fieldfare (*Turdus pilaris*). Purchased.

1 Ortolan Bunting (*Emberiza hortulana*). Purchased.

2 Diuca Finches (*Diuca grisea*). Bred in the Gardens.

24. 1 Macaque Monkey (*Macacus cynomolgus*). Born in the menagerie.

25. 1 Hoffmann's Sloth (*Cholopus hoffmanni*). Deposited.

29. 1 Reticulated Python (*Python reticulatus*). Presented by Dr. Hampshire. From Penang.

2 Wattled Guans (*Aburria carunculata*). Presented by Mr. L. Merinor. See P. Z. S. 1876, p. 696.

1 Doubtful Toucan (*Ramphastos ambiguus*). Presented by Mr. L. Merino.

Aug. 29. 2 White-headed Sea-Eagles (*Haliaëtus leucocephalus*). Presented by Mr. F. W. Stockwell.

30. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. W. Holman.

1 Adorned Terrapin (*Clemmys ornata*). Purchased.

31. 2 Arabian Gazelles (*Gazella arabica*), ♂ and ♀. Deposited.

Sept. 1. 1 Rhesus Monkey (*Macacus erythræus*), ♀. Presented by Mr. A. Stafford Northcote.

2 Salt-water Terrapins (*Clemmys terrapin*). Presented by Mr. E. B. Scott. From Galveston, Texas.

2. 1 Leonine Monkey (*Macacus leoninus*), ♀. Presented by Mr. F. Barbellion.

1 White-fronted Capuchin (*Cebus albifrons*), ♂. Presented by the Rev. J. Roe.

1 White-throated Capuchin (*Cebus hypoleucus*), ♀. Presented by the Rev. J. Roe.

4. 1 Greater Black-backed Gull (*Larus marinus*). Presented by Mr. W. J. Stebbing.

5. 1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by Dr. J. T. Blackley.

1 Long-eared Owl (*Otus vulgaris*). Presented by the Misses S. E. P. and A. Warre.

2 Salt-water Terrapins (*Clemmys terrapin*). Presented by Mr. J. R. Gillespie. From Galveston, Texas.

2 Yellow-billed Ducks (*Anas xanthorhyncha*), ♀ ♂. Received in exchange.

2 Plumed Colins (*Callipepla picta*). Received in exchange.

2 Bronze-winged Pigeons (*Phaps chalcoptera*). Bred in the Gardens.

7. 2 Common Barn-Owls (*Strix flammea*). Presented by Mr. T. May.

9. 3 Hybrid Bankiva Fowls (between *Gallus bankiva* and *Gallus domesticus*). Presented by Mr. H. F. Phillips.

12. 1 Pig-tailed Monkey (*Macacus nemestrinus*), ♀. Presented by Mr. T. Meyrick.

13. 2 Black-faced Spider Monkeys (*Ateles ater*). Purchased.

1 Common Raccoon (*Procyon lotor*). Presented by Mr. H. B. Whitmarsh.

1 Coati (*Nasua nasica*), ♂. Presented by Mr. C. R. Bree, F.Z.S.

1 King Parrakeet (*Aprosmictus scapulatus*). Presented by Mr. H. T. Sissons.

2 Perch (*Perca fluviatilis*). Presented by Master Sclater.

11 Perch (*Perca fluviatilis*). Presented by Master B. L. Sclater.

14. 1 Crowned Eagle (*Spizaëtus coronatus*), juv. Presented by Sergt.-Major S. Rowe. From Rio Pongas, W. Africa.

1 Fork-tailed Jungle-Fowl (*Gallus furcatus*). Presented by Mr. W. T. Fraser, C.M.Z.S.

15. 1 Black-eared Marmoset (*Hapale penicillata*), ♀. Presented by Miss Woolworth.

1 Burchell's Zebra (*Equus burchelli*), ♂. Deposited.

16. 1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by Mr. E. Soy.

1 Bonnet-Monkey (*Macacus radiatus*), ♂. Deposited.

2 Hairy Armadillos (*Dasypus villosus*). Purchased.

2 Russell's Vipers (*Vipera russelli*). Born in the Gardens.

Sept. 18. 1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by Mr. C. E. Green.
1 Grey Ichneumon (*Herpestes griseus*), ♂. Presented by Mr. G. J. Hendry.
19. 1 Common Boa (*Boa constrictor*). Presented by Mr. F. B. Bloxham.
1 Red-and-yellow Macaw (*Ara chloroptera*). Deposited.
20. 1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by Mr. R. K. Meaden.
1 Hog-Deer (*Cervus porcinus*), ♂. Born in the Menagerie.
22. 1 Striped Hyæna (*Hyæna striata*). Presented by Mr. T. Barber.
1 Arabian Gazelle (*Gazella arabica*), ♀. Presented by Mr. F. de Havilland Hall.
1 Red-fronted Amazon (*Chrysotis vittata*). Purchased.
23. 1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by Capt. J. C. A. Lewis.
25. 1 Slaty-headed Parrakeet (*Palæornis schisticeps*). Purchased. See P. Z. S. 1876, p. 696.
1 Ring-necked Parrakeet (*Palæornis torquata*). Presented by Mrs. B. Bennett.
5 Perch (*Perca fluviatilis*). Presented by Master B. L. Sclater.
26. 1 Bonnet-Monkey (*Macacus radiatus*). Presented by Mr. John Long.
27. 1 Black-eared Marmoset (*Hapale penicillata*). Presented by the Rev. S. R. Long.
28. 1 Rüppell's Spur-winged Goose (*Plectropterus rueppelli*), ♂. Presented by M. J. M. Cornély, C.M.Z.S. See P. Z. S. 1876, p. 696.
29. 4 American Darters (*Plotus anhinga*). Purchased. See P. Z. S. 1876, p. 696.
2 Brazilian Cormorants (*Phalacrocorax brasiliensis*). Purchased.
2 Boat-bills (*Cancroma cochlearia*). Purchased.
1 Sun-Bittern (*Eurypyga helias*). Purchased.
1 Black-necked Buzzard (*Buteogallus nigricollis*). Purchased.
2 Black-faced Ibises (*Geronticus melanopis*). Purchased.
1 Stilt-Plover (*Himantopus nigricollis*). Purchased.
1 Rufous Tinamou (*Rhynchotus rufescens*). Purchased.
1 Tataupa Tinamou (*Crypturus tataupa*). Purchased.
1 Undulated Tinamou (*Crypturus undulatus*). Purchased.
2 West-African Melba Finches (*Pytelia citerior*). Purchased.
5 Scaly-fronted Finches (*Estrelda squamifrons*). Purchased.
5 Brazilian Teal (*Querquedula brasiliensis*). Purchased.
3 Bahama Ducks (*Pœcilonetta bahamensis*). Purchased.
1 Red-billed Tree-Duck (*Dendrocygna autumnalis*). Purchased.
1 Western Slender-billed Cockatoo (*Licmetis pastinator*). Received in exchange.
2 Chinese Jay-Thrushes (*Garrulax chinensis*). Received in exchange.
1 Grey Struthidea (*Struthidea cinerea*). Received in exchange.

Oct. 2. 2 Silky Marmosets (*Midas rosalia*), ♂ ♀. Presented by Master T. A. Brassey.
1 Green Monkey (*Cercopithecus callitrichus*), ♀. Presented by Mr. C. L. N. Ingram.
2 Pied Wagtails (*Motacilla yarrelli*). Purchased.

Oct. 3. 2 Coatis (*Nasua nasica*). Presented by Mr. J. A. Watson.
1 Entellus Monkey (*Semnopithecus entellus*). Presented by Mr. Edwin Penn.
4. 1 Vulpine Phalanger (*Phalangista vulpina*). Presented by the Hon. Graham M. Sutton.
4 European Terrapins (*Clemmys europæa*). Presented by Mr. Ewd. Wm. Bonham.
5. 2 Tora Antelopes (*Alcelaphus tora*). Purchased.
2 Sœmmering's Antelopes (*Gazella sœmmeringi*). Deposited.
1 Horned Lizard (*Phrynosoma cornutum*). Presented by Mr. A. N. Shillingford.
1 Crested Pigeon (*Ocyphaps lophotes*). Bred in the Gardens.
6. 1 Fieldfare (*Turdus pilaris*). Presented by Mr. F. Lubbock.
2 Redwings (*Turdus iliacus*). Presented by Mr. F. Lubbock.
7. 2 Brown Bears (*Ursus arctos*). Deposited.
1 Weka Rail (*Ocydromus australis*). Presented by Capt. Jessop.
2 Shore-Larks (*Eremophila alpestris*). Presented by Mr. A. Hewitson.
8. 2 Parrot Fruit-pigeons (*Treron viridis*). Deposited.
1 Bronze-spotted Dove (*Chalcopelia chalcospilos*). Presented by E. C. Ionides, Esq., F.Z.S.
1 Vinaceous Turtle Dove (*Turtur vinaceus*). Presented by E. C. Ionides, Esq., F.Z.S.
9. 9 Alpine Newts (*Triton alpestris*). Presented by Mr. P. L. Sclater, F.R.S. From Tyrol.
10. 1 Little Grebe (*Podiceps minor*). Presented by Mr. W. Johnson.
1 Ocelot (*Felis pardalis*). Deposited.
11. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by Mr. H. J. Jones.
1 Chacma Baboon (*Cynocephalus porcarius*). Presented by Mr. H. S. Wright.
1 Geoffroy's Dove (*Peristera geoffroii*). Bred in the Gardens.
12. 1 Pig-tailed Monkey (*Macacus nemestrinus*), ♂. Deposited.
13. 2 Indian Cobras (*Naia tripudians*). Presented by Sir Joseph Fayrer, C.S.I., F.Z.S.
14. 1 Tamandua Ant-eater (*Tamandua tridactyla*). Purchased.
2 Snowy Owls (*Nyctea nivea*). Presented by Mr. C. L. W. Gardner.
16. 1 Rhesus Monkey (*Macacus erythræus*), ♀. Presented by Mr. M. Almond.
2 Palm-Squirrels (*Sciurus palmarum*), ♀ ♀. Presented by Mr. H. Grey.
1 Herring-Gull (*Larus argentatus*). Deposited.
1 Pied Wagtail (*Motacilla yarrelli*). Purchased.
18. 1 Greater Spotted Woodpecker (*Picus major*). Presented by Miss Martindale.
1 Common Barn-Owl (*Strix flammea*). Presented by Mr. C. J. Sims.
19. 1 Collared Peccary (*Dicotyles tajacu*). Purchased.
1 Tataupa Tinamou (*Crypturus tataupa*). Purchased.
1 Fuliginous Tanager (*Pitylus fuliginosus*). Purchased.
1 Magpie Tanager (*Cissopis leveriana*). Purchased.
4 Black-crested Cardinals (*Gubernatrix cristatella*). Purchased.
2 Ashy-headed Gulls (*Larus cirrocephalus*). Purchased.
2 De Filippi's Meadow Starlings (*Sturnella defilippii*). Purchased.
21. 1 Grivet Monkey (*Cercopithecus griseoviridis*) ♀. Presented by Mr. T. T. Sich.
1 Green Turtle (*Chelone viridis*). Presented by Master Strover.

Oct. 23. 1 Cape-Hyrax (*Hyrax capensis*). Presented by Mr. J. M. Thornton.
1 Common Hangnest (*Icterus vulgaris*). Presented by Mr. J. T. Levett.
1 Merlin (*Hypotriorchis æsalon*). Purchased.
24. 1 African Cobra (*Naia haje*). Presented by Rev. G. H. R. Fisk.
25. 2 Norwegian Lemmings (*Lemmus norvegicus*). Presented by Mr. W. Duppa Crotch.
26. 1 Vervet Monkey (*Cercopithecus lalandi*). Deposited.
1 Common Crossbill (*Loxia curvirostra*). Presented by Master Geo. Godson.
2 Indian Cobras (*Naia tripudians*). Received in exchage.
28. 1 Ocelot (*Felis pardalis*). Presented by Mr. H. Fielding.
31. 1 Puma (*Felis concolor*). Presented by Miss Brassey. From Santa Fe, Argent. Repub.
1 Sulphur-breasted Toucan (*Ramphastos carinatus*). Purchased. From Cartagena.
1 Duck-Falcon (*Falco anatum*). Purchased. Captured at sea.
2 Black Tortoises (*Testudo carbonaria*). Purchased.
1 Common Boa (*Boa constrictor*). Purchased.
1 Osprey (*Pandion haliaëtus*). Purchased.
1 Sclater's Tanager (*Euphonia sclateri*). Purchased. From Porto Rico.
1 Andean Goose (*Bernicla melanoptera*). Purchased.

Nov. 1. 1 Bonnet-Monkey (*Macacus radiatus*). Deposited.
2 Senegal Touracous (*Corythaix persa*). Deposited.
1 Sun-Bittern (*Eurypyga helias*). Deposited.
1 Scarlet Ibis (*Ibis rubra*). Deposited.
1 Javan Sparrow (*Padda oryzivora*). Presented by Miss S. de Holter.
2. 2 Domestic Swine (*Sus scrofa*), ♂ ♀. Solid-hoofed variety. Presented by Mr. J. A. de Aldama. From Cuba. See P. Z. S. 1877.
3. 1 Persian Gazelle (*Gazella subgutturosa*), ♂. Presented by Mr. T. Fowler.
1 Ringnecked Parrakeet (*Palæornis torquata*). Deposited.
4. 1 Emu (*Dromæus novæ hollandiæ*). Presented by Mr. W. Battersby.
1 St. Helena Seed-eater (*Crithagra butyracea*). Presented by Mr. A. H. Cocks, F.L.S.
6. 2 Esquimaux Dogs (*Canis familiaris*), ♂ ♂. Presented by Capt. Allen Young.
4 Visachas (*Lagostomus trichodactylus*). Presented by Mr. C. F. Woodgate.
7. 1 American Thrush (*Turdus migratorius*). Deposited.
6 Double-spurred Francolins (*Francolinus bicalcaratus*). Deposited.
8. 1 Green Monkey (*Cercopithecus callitrichus*), ♀. Presented by Miss Ridsdan.
4 Redpolls (*Linaria borealis*). Purchased.
9. 1 Raven (*Corvus corax*). Presented by Miss L. Collier.
10. 3 American Red Foxes (*Canis fulvus*). Deposited.
1 Golden Eagle (*Aquila chrysaëtos*). Deposited.
2 Banded Ichneumons (*Herpestes fasciatus*). Presented by Mr. W. N. Bakewell.
3 Chipping Squirrels (*Tamias striatus*). Presented by Mr. F. W. Stockwell.

Nov. 10. 1 Peregrine Falcon (*Falco peregrinus*). Presented by Mr. Chilton Newburn.
11. 1 Long-eared Bat (*Plecotus auritus*). Presented by Miss E. M. Smee.
12. 2 Redwings (*Turdus iliacus*). Purchased.
13. 1 Bubaline Antelope (*Alcelaphus bubalis*), ♂. Purchased.
1 Addax Antelope (*Addax naso-maculatus*), ♀. Purchased.
1 Buff-breasted Partridge (*Ptilopachys ventralis*). Purchased.
1 Hairy-rumped Agouti (*Dasyprocta prymnolopha*). Born in the Gardens.
1 Macacque Monkey (*Macacus cynomolgus*). Deposited.
14. 1 Chilian Sea-Eagle (*Geranoaëtus aguia*). Deposited.
16. 2 Prussian Carp (*Carassius vulgaris*). Presented by Lord Arthur Russell, F.Z.S.
17. 4 Brazilian Cormorants (*Phalacrocorax brasiliensis*). Purchased. See P. Z. S. 1876, p. 676.
20. 1 Indian Leopard (*Felis pardus*), ♂. Deposited.
21. 1 Globose Curassow (*Crax globicera*), ♀. Purchased.
1 Hooded Crane (*Grus monachus*). Purchased. See P. Z. S. 1876, p. 676.
22. 1 Bonnet-Monkey (*Macacus radiatus*). Presented by Mr. E. F. Mathews.
1 Slender-billed Cockatoo (*Licmetis pastinator*). Presented by Mrs. Stevens.
1 Gannet (*Sula bassana*). Presented by Mr. R. H. W. Leach.
1 Shahin Falcon (*Falco peregrinator*). Captured at sea near Aden. Presented by Mr. A. Whyte.
23. 1 Grivet Monkey (*Circopithecus griseo-viridis*), ♂. Deposited.
1 Indian Muntjac (*Cervulus muntjac*), ♀. Born in the Menagerie.
26. 1 Japanese Deer (*Cervus sika*), ♂. Born in the Menagerie.
28. 1 Bonnet Monkey (*Macacus radiatus*), ♀. Presented by Mrs. Aspinall.
1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. R. Schott y Larios.
1 Duyker Bok (*Cephalophus mergens*), ♂. Presented by Mr. J. D. Witherspoon.
1 Spring Bok (*Gazella euchore*), ♀. Purchased.
4 Chiloe Widgeons (*Mareca chiloënsis*), 2 ♂ & 2 ♀. Received in exchange.
29. 3 Rough-legged Buzzards (*Archibuteo lagopus*). Received.
30. 1 White-throated Capuchin (*Cebus hypoleucus*), ♀. Presented by Mr. H. B. Whitmarsh.
1 Hairy-rumped Agouti (*Dasyprocta prymnolopha*). Presented by Mrs. Booth.
1 Long-nosed Crocodile (*Crocodilus cataphractus*). Deposited.

Dec. 2. 1 Rufescent Snake (*Leptodira rufescens*). Presented by Rev. G. H. R. Fisk.
1 Rufous Snake (*Ablabes rufulus*). Presented by Rev. G. H. R. Fisk.
4. 1 Snowy Owl (*Nyctea nivea*). Presented by Mr. John Kendall. From the West of Ireland. See P. Z. S. 1877, p. 1.
5. 1 Patcas Monkey (*Cercopithecus ruber*), ♀. Presented by Mr. J. W. Feather.
1 Brown Capuchin (*Cebus fatuellus*), ♂. Deposited.
6. 1 Chiloe Widgeon (*Mareca chiloënsis*), ♀. Received in exchange.
1 Royal Python (*Python regius*). Deposited.
1 West-African Python (*Python sebæ*). Deposited.

Dec. 7. 1 Kinkajou (*Cercoleptes caudivolvulus*). Deposited.
1 Short-eared Owl (*Otus brachyotus*). Presented by Mr. W. K. Stanley.
8. 2 Crested Guinea Fowls (*Numida cristata*). Presented by Mr. D. R. Ratcliff.
8. 2 King Parrakeets (*Aprosmictus scapulatus*). Presented by Miss E. Rigby.
9. 1 Australian Crane (*Grus australasiana*). Presented by Mr. H. Roberts.
3 Mexican Jays (*Cyanocorax luxuosus*). Purchased. See P. Z. S. 1877, p. 1.
11. 1 Sykes's Monkey (*Cercopithecus albogularis*), ♀. Presented by Mr. R. Payne.
1 Silver-backed Fox (*Canis chama*), ♂. Presented by Mr. R. Ladd.
2 Jardine's Parrots (*Pœocephalus gulielmi*). Purchased.
12. 1 Rhesus Monkey (*Macacus erythræus*), ♂. Presented by Mr. J. H. Ivory.
2 Orange-headed Ground-Thrushes (*Geocichla citrina*). Purchased. See P. Z. S. 1877, p. 2.
2 White-throated Jay-Thrushes (*Garrulax albogularis*). Purchased. See P. Z. S. 1877, p. 2.
1 Horsfield's Whistling Thrush (*Myiophoneus horsfieldi*). Purchased. See P. Z. S. 1877, p. 2.
1 Common Buzzard (*Buteo vulgaris*). Purchased.
13. 1 Black-headed Gull (*Larus ridibundus*). Presented by Mr. J. Smart.
15. 1 Hoffmann's Sloth (*Cholopus hoffmanni*). Presented by Mr. L. R. Dickinson.
16. 1 Vervet Monkey (*Cercopithecus lalandi*), ♀. Presented by Mr. T. Mash.
1 Red Coati (*Nasua nasica*), ♀. Deposited.
1 Common Paradoxure (*Paradoxurus typus*). Presented by Mr. J. B. Wilson.
1 Bungoma Water-Tortoise (*Emyda granosa*). Presented by Mr. J. B. Wilson. From the river Jumna.
18. 1 Dunlin (*Tringa cinclus*). Presented by Mr. F. Cresswell.
20. 1 Chinese Eyebrowed Thrush (*Leucodioptron canorum*). Presented by Mrs. Arabin.
1 Short-eared Owl (*Otus brachyotus*). Presented by Mr. J. Lee.
21. 1 Greater Sulphur-crested Cockatoo (*Cacatua galerita*). Deposited.
1 King Parrakeet (*Aprosmictus scapulatus*). Deposited.
1 Scaly Ground-Dove (*Scardafella squamosa*). Purchased.
22. 1 Bonnet-Monkey (*Macacus radiatus*), ♀. Presented by Mr. Peter Varwell.
1 Bonnet-Monkey (*Macacus radiatus*), ♀. Presented by Mrs. Evans.
1 Redwing (*Turdus iliacus*). Presented by Mrs. A. H. Jamrach.
3 Golden Orioles (*Oriolus galbula*). Presented by Mrs. A. H. Jamrach.
1 Snowy Owl (*Nyctea nivea*). Deposited. From Lancaster Sound.
29. 1 Yellow-lored Amazon (*Chrysotis xantholora*). Purchased.
30. 6 Greek Partridges (*Caccabis saxatilis*). Presented by Commander F. M. Burke. From Persia.
2 Black-headed Partridges (*Caccabis melanocephala*). Presented by Commander F. M. Burke. From Hedyar, near Mecca. See P. Z. S. 1877, p. 2.
1 Hey's Partridge (*Caccabis heyi*). Presented by Commander F. M. Burke. From Hedyar, near Mecca. See P. Z. S. 1877, p. 2.

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